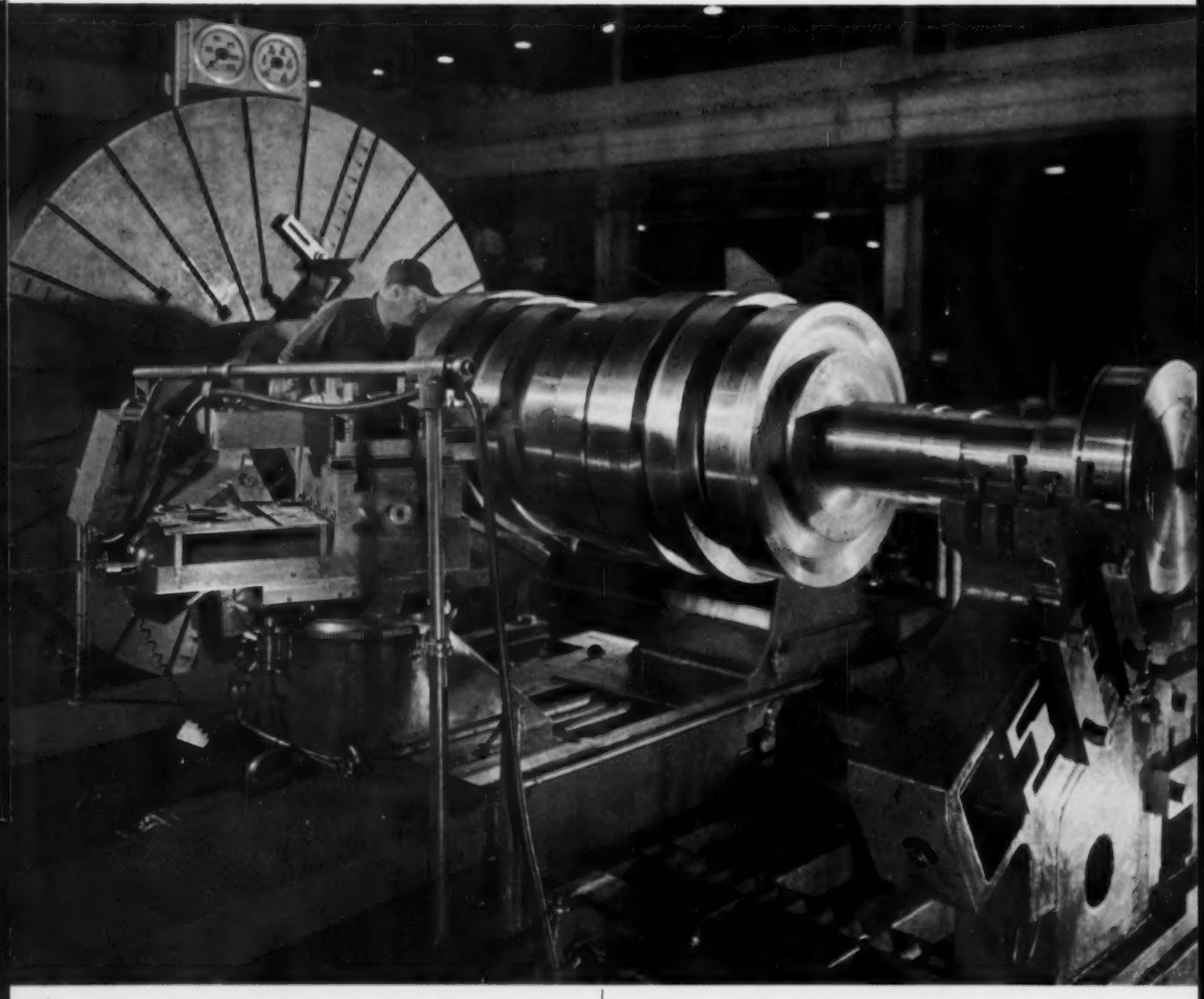
The IRON AGE
October 16, 1958 A Chilton Publication The National Metalworking Weekly



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How To Get More For Your Special Alloy Dollar P. 185

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The IRON AGE

October 16, 1958—Vol. 182, No. 16

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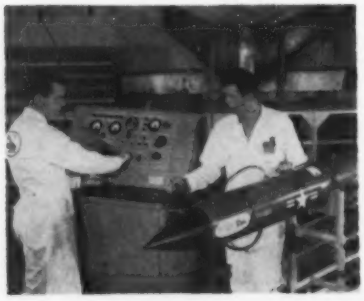
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SIGN OF THE TIMES

Industry Teaming Up — Closer working partnerships of metalworking and electronics is a sign of the times. You can look for more teamwork as we get deeper into electronics age. P. 153



SPACE AGE JOB NEEDS

Growing Technical Demands — Metalmaking and using industries are hiring more technical and professional workers. Job training programs must be increased to keep pace with our rapid technical growth. P. 155

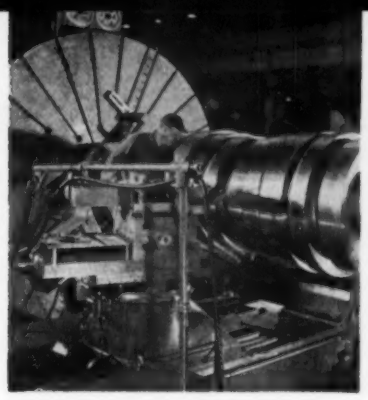
OPENHEARTHS

A Breakthrough — Some steel mills feel they have come up with an openhearth roof that stands up under volume use of oxygen. An 800 pct increase in oxygen use may be forthcoming. P. 157

GAS INDUSTRY

Growth Forecast — at AGA convention, the industry set its

Metalworking



FERROUS ALLOYS: They can be best classified by the jobs they're intended to handle. Alloy turbine spindle undergoes machining in 144-in. lathe at Allis-Chalmers. The latest in the metalworking dollar series covers eight major kinds of special ferrous alloys. P. 185

sights on the decade ahead. Sales are expected to increase 230 pct by 1970. Gas reserves are adequate. P. 160

ULTRA-STRONG STEEL

Developed at Ford — Metallurgists at Ford Motor Co. announce a new ultra-high strength steel. It has tensile strength of over 400,000 lb per sq in. P. 161

METAL SHOW FEATURES

HOW TO GET MORE FROM SPECIAL FERROUS ALLOYS

Sturdy Springs—Although most spring steels are nothing more or less than a plain carbon steel, it's the quality that counts. Ductility, hardenability, finish, high fatigue value are just a few of points to be spelled out. P. 186

Electrical Cores—The most common core materials are silicon sheet steels. They are the choice because they have three special properties: high permeability, high electrical resistance, and low hysteresis loss. P. 188

Magnetic Alloys—They're often the heart of electrical machinery with two separate classes: soft and hard. Silicon and iron nickel alloys lead the list of soft core materials. There are six major groups from which to choose hard core or permanent magnets. P. 190

Heat and Corrosion — For heat resistance, it's problem of choosing the right casting alloy in terms of both temperature and operating conditions. For castings to withstand corrosion, again it's a matter of spelling out corrosive conditions. P. 194

Choice for Wear — Austenitic manganese steels withstand both severe wear and heavy impact. For case hardness, many low-alloy steels can be nitrided, while there's a special series of steels that give the best results. P. 198

Low in Nickel—One good reason for knowing how to make better use of the stainless substitutional alloys, the 200 series, is that most of them are very low in nickel. Low temperature toughness is one feature. P. 199

MARKETS & PRICES

FOUNDRIES

Interested in Equipment — The foundry equipment makers' order books are still roomy, but rate of inquiries has them smiling. Many believe a break-through is in the making. P. 158

AUTO SALES BATTLE

'Big Two' Are Ready — 1959 Fords show some family resemblance to '58 models, but Chevrolets are radically new. This growing difference in styling policy may be the deciding factor in 1959 sales. P. 168

FARWEST ECONOMY

On the Rebound — Economic barometers on the West Coast are again pointing upward. Worker demand grows, plant expansions continue, and road building improves. P. 175

INVENTORY PUSH

Buyers Rebuilding Stocks—Inventory rebuilding is giving the steel market pickup an added push. Market trend is bullish. P. 273

FOUNDRY SALES

More Customer Service—Foundries are bidding for more business by providing design service. Product redesign may cut production costs considerably, they point out. P. 274

NEXT WEEK

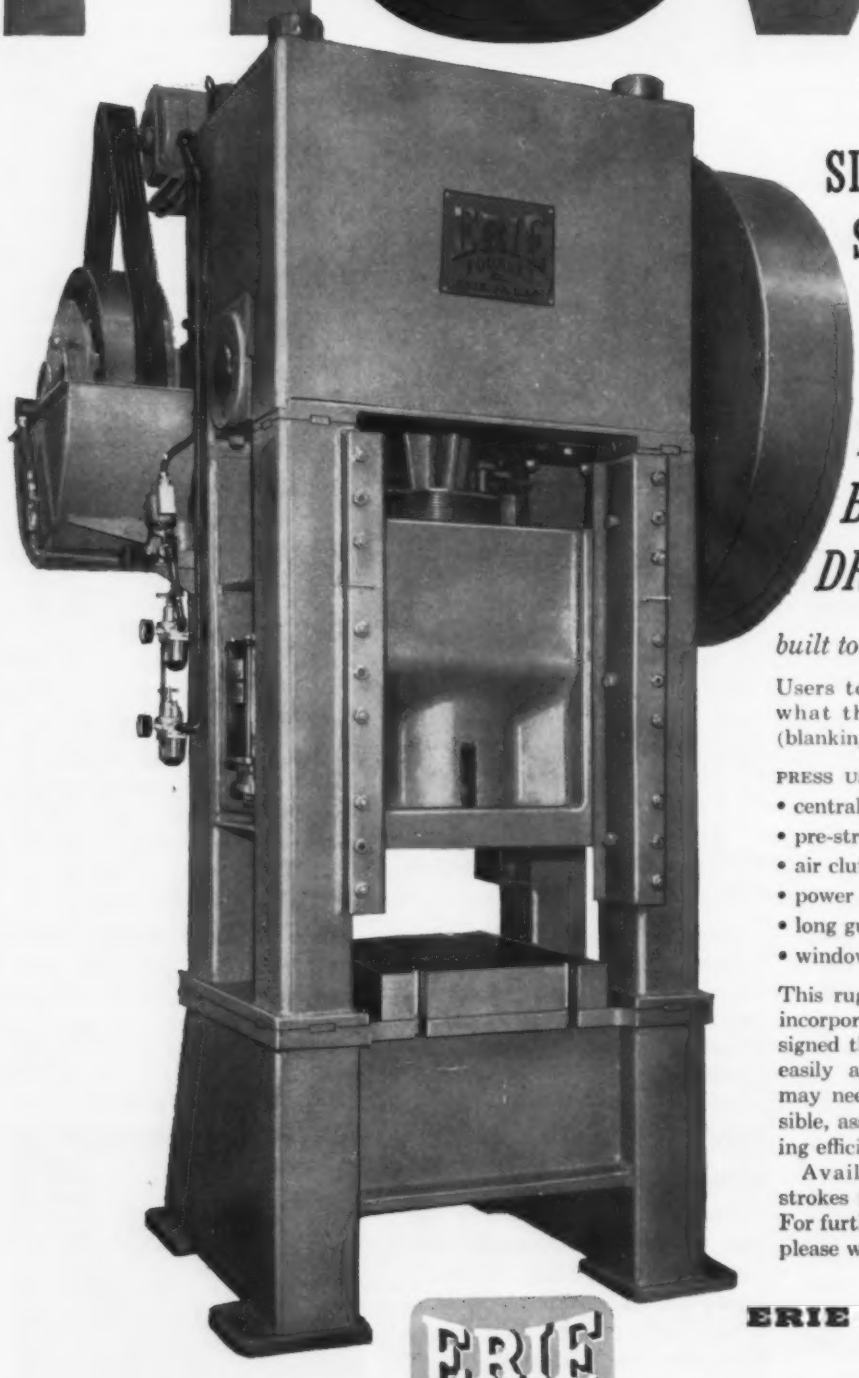
RUSSIAN STEEL MEN

Touring U. S. Mills—For the past several weeks, Soviet steel men have been touring American plants (shown at Armco's Middletown Works, right). Next week, their views on different phases of U. S. steelmaking practices will be reported.



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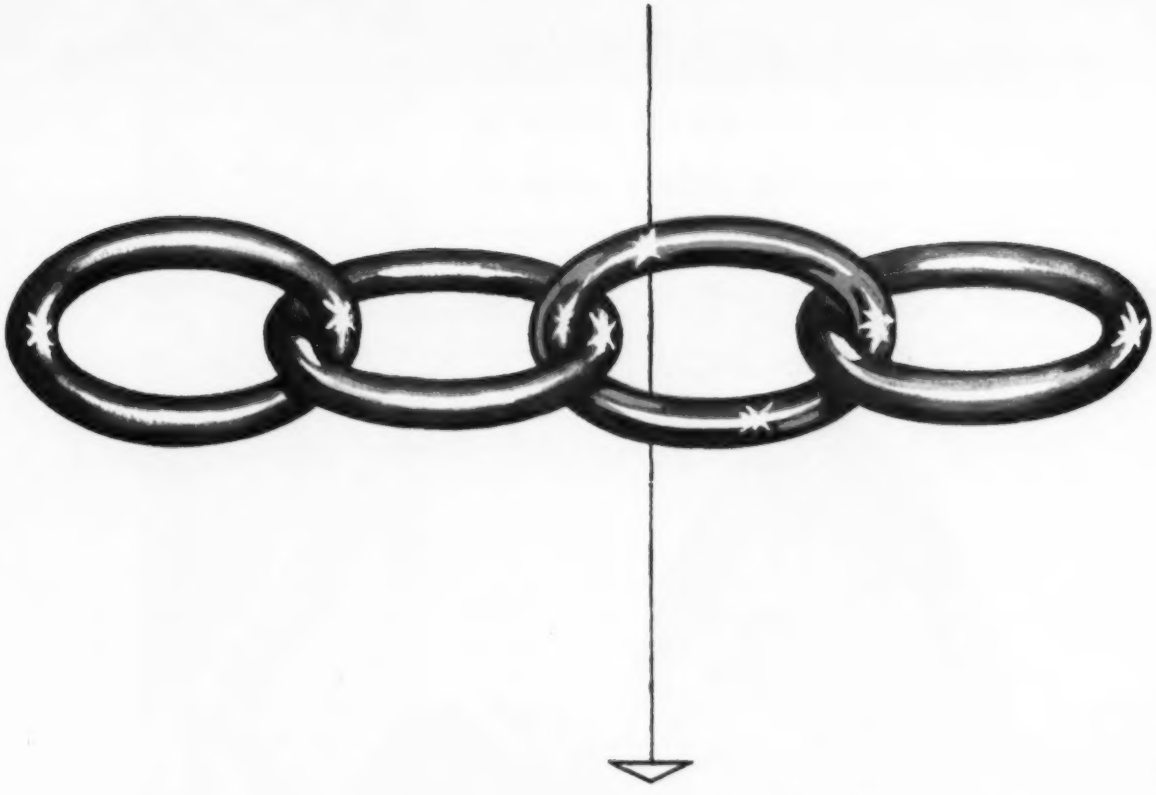
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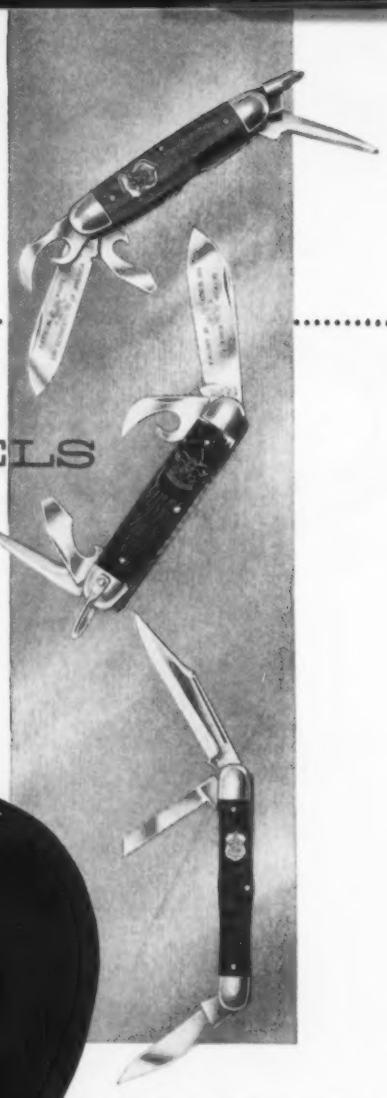
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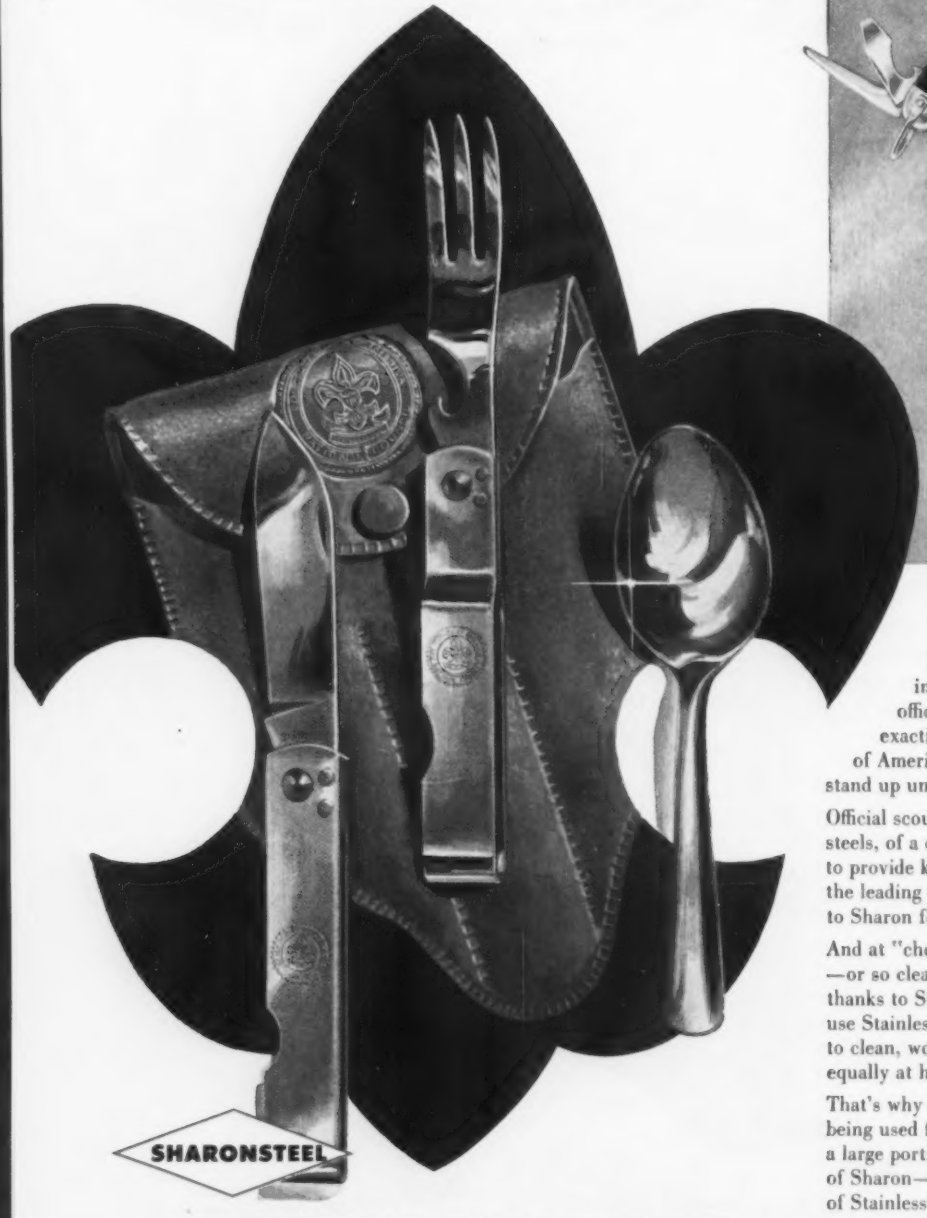
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Business and Politics

There Is Still Much to be Done

The trend is now toward a much better participation of business and businessmen in politics. Of course that is all to the good. It may be that it is long overdue.

But to shout hurrahs just because some stout-hearted men and firms are getting into the fight may be premature. There are still many people in industry who feel that this new move of business to inform its workers, stockholders, and customers of political "goings-on" may be a wrong tack.

Mr. George Meany, AFL-CIO president, believes that the battle between labor and management has now moved to the legislatures. It may have. So far labor leaders and their spokesmen have an edge on management when it comes to getting the story across.

That's where the rub comes. And that's where there must be some substantial changes in management's attempts to "sound an alarm" about free enterprise's danger and the unions' monopoly.

There are few public debates where management will pit itself against labor spokesmen. Labor seeks out these chances on radio, television, and large public meetings. Many top management men give excellent talks. But they go before limited and special bodies, most of whom agree with the speaker beforehand. The report on such talks usually goes in the financial section of the paper—a place where more of the same people who "believe" shake hands with each other.

Our major trouble in getting across the story of free enterprise is communications. Also, it could be our choice of the podium. It is a hard fight. But those firms who have done a good community relations job are heartened by their results over the past many years.

It is hard for most businessmen to simply and strongly sound sincere warnings: That our economy is headed towards more socialism and towards less merit for those who merit it. It is hard to sell the idea that we may reach a point where we will have a national weakness when our very existence demands strength.

But something has to be done. The ones who are doing it now may become a shining example for others to take heart and tell their story—not to the economic club of this or that town but to the whole town. Before that point is reached, many of our businessmen must learn how to debate, how to give and take, and how to speak the common language.

Tom Campbell

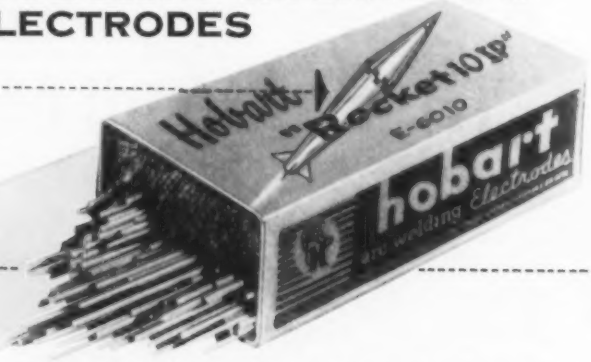
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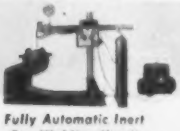

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Russian Steel

Sir—Will you please send to me two reprints of the "Russian Steel Industry" as published in the Sept. 4 issue of The IRON AGE?

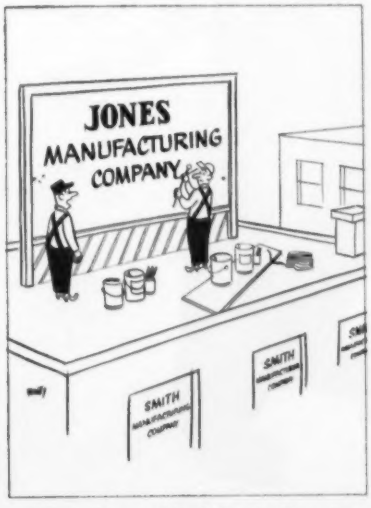
I have just returned from Russia and find this report so interesting I want it for my permanent file.—J. T. Moore, Fireproof Products Co., Charleston, W. Va.

Sir—Your article regarding Soviet steel is a real eye opener in many ways.

I shall appreciate your sending the writer three or four copies to put in the proper hands.—R. R. Newell, Asst. Mgr. of Sales, Bar Div., Republic Steel Corp., Cleveland.

Sir—It would be a favor to receive additional copies of your splendid presentation. These copies are to be used in our class program in management.—G. S. Schaller, Professor, Univ. of Washington, Dept. of Mechanical Eng., Seattle.

Sir—We found the article extremely interesting, and would appreciate receiving three reprints.—G. M. Haas, Secretary-Treasurer, Mesabi Iron Co., New York.



"I can't get rid of the feeling that something is wrong!"

Sir—I would appreciate a reprint of the article on Russian steel. My work with the department is concerned with the economics of iron ore and iron and steel in this country with a broad knowledge of this industry in other lands.—T. H. Janes, Mineral Economics Section, Dept. of Mines and Technical Surveys, Ottawa, Canada.

Sir—We have seen your article on "The Russian Steel Industry." Since several U. S. Steel men visited Russia, many of our people are quite interested in such information.

Therefore, if possible, will you please send us six copies or whatever number you can spare.—J. J. Beinlich, Mgr., Technical Information Sect., Research and Technology Div., U. S. Steel Corp., Pittsburgh.

Sir—I conduct several courses and seminars dealing with the Soviet Union, and shall greatly appreciate your assistance in sending me two copies of the article by G. F. Sullivan.—M. V. Condoide, Assoc. Professor of Economics, Ohio State Univ., Columbus.

Floating Metal

Sir—A Newsfront item entitled "Metal That Almost Floats" appeared in your Sept. 4 issue. It described a magnesium-lithium alloy structure reinforced internally with steel fibers.

As you may know, Battelle has been very active for many years in the development of magnesium-lithium alloys. We are interested in this new development and would like to contact the people doing this work.—P. D. Frost, Chief, Light Metals Div., Battelle Memorial Institute, Columbus, O.

▪ Contact Don McPherson, Armour Research Foundation, Chicago.—Ed.



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Introducing a Spindle

This is our way of introducing the spindle on the front cover illustrating the latest in our "how to get more for your metalworking dollar" series. The subject this time is special ferrous alloys and the article begins on p. 185 of this issue.

For the story Michael Durante, master photographer at Allis-Chalmers Co., took pictures of the spindle—made of nickel, molybdenum, and vanadium steel—at the firm's West Allis, Wisconsin Works.

It's a double-flow, low-pressure spindle for a 150,000 kw reheat tandem steam turbine. Machining to cut integral disks before grooving is done on a 144-in. heavy duty, electronically-controlled lathe.

Stab in the Back

It had to happen sometime. And it did last week at Portland, Oregon. Some pickets picketing a machinery supply company were picketed. Picketing the pickets was a man from a canvas products outfit. The reason? The strikers were carrying signs made in a non-union shop.

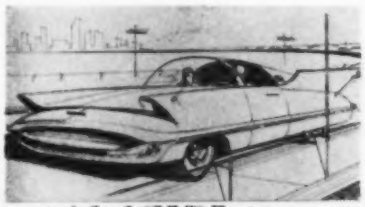
Thought for Today

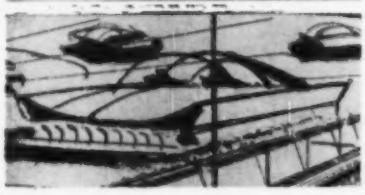
Tacked to the wall of a power mower repair shop we recently visited was a sign distributed by the Penn Ball Bearing Co. of Philadelphia. It contained these words of wisdom: It's all right to do your work half slow—just don't do it half fast.

Forward Thinking

Predictions about the future are fascinating. On p. 153 of this issue we're taking a look at how management will meet the challenge of Space Age technical needs.

Well, that recalled the king-size edition of IRON AGE we put out in 1955 to celebate our 100th Anniversary. In that issue we published some drawings of the cars of the future (see below).





Now, (we'd like to point out) the future has caught up with our artist. Our futuristic auto (top) bears quite a resemblance from the front to the recent Lincoln. And it's clearly got the 1959 Chrysler tail fins.

Then take a look at the front end of the car at the bottom. Is that or is that not, the 1959 Buick?

Puzzler Answer

Referring to the Aug. 17th puzzler: The donator, Bill Cheney, Colfax & Cheney Mfg. Co., says the water level goes down. Guess this is right and those who proved it are as follows: Harry J. Drews, Pacific Industrial Mfg., Oakland, Cal.; Frank Forquer, Daystrom Instrument, Archbald, Pa.; David L. Keller, U. S. Steel, Pittsburgh.

Also, W. C. Cropper, American Steel Barrel Co., Pittsburgh; Arthur Longini, The Pittsburgh & Lake Erie Railroad Co., Pittsburgh; R. W. Hautzenroeder, Massey-Ferguson, Inc., Detroit; Arlan F. Walker, Ordnance Plant, Burlington, Iowa.

Atlas

PLANT-WIDE PROTECTION STOPS CORROSION!



ATLAS CORROSION-PROOF CEMENTS

. . . complete line of sulfur silicate and resin based cements for plant-wide use in constructing corrosion-proof tanks, floors, pits, trenches and sumps.

ATLAS CORROSION-PROOF TANK LININGS



. . . natural or synthetic rubber and asphaltic materials designed to meet specific corrosive conditions within your plant and installed at the job site or in Atlas shops.



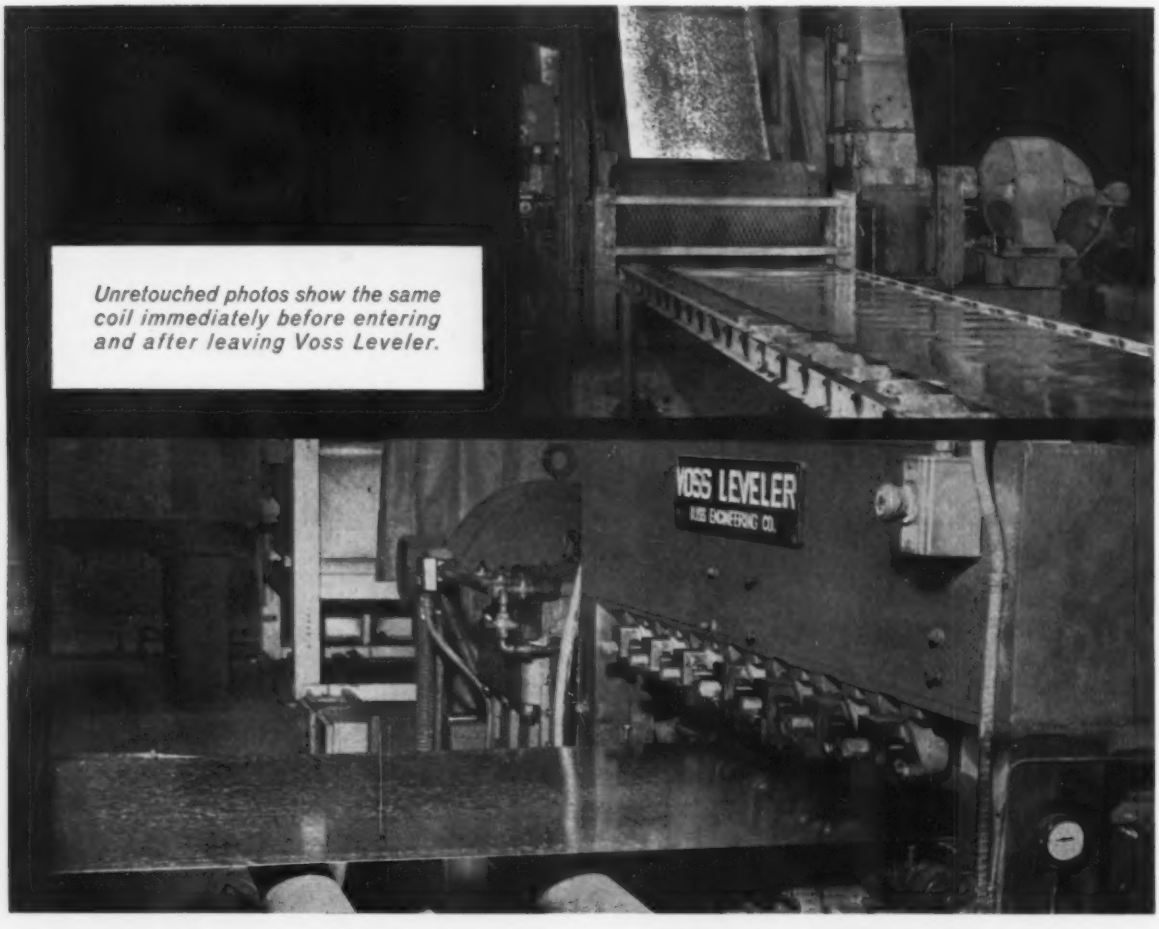
ATLAS RIGID PLASTIC STRUCTURES

. . . corrosion-proof, self supporting polyvinyl chloride designed and fabricated for use as tanks, ducts and fume systems to meet your exact needs . . . plastic pipe systems to convey all your corrosives.

These products will give you permanent plant-wide protection against corrosives.

Write for Bulletin CC-3.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA



Unretouched photos show the same coil immediately before entering and after leaving Voss Leveler.

Better than
1000 TONS DAILY PRODUCTION
Equaling or Exceeding Stretcher-Level Flatness with VOSS ROLLER LEVELERS

This Voss Inverted Roller Leveler is one of several installed in the high speed galvanizing lines of a leading sheet producer. Operating in a range of 10 to 30 gauge, Voss Levelers are giving this producer a new standard of flatness and greatly improved non-fluting qualities. The result is a sheet or coil equal to or exceeding stretcher-level flatness . . . at top production speeds.

Voss-patented design features offer unusual precision and flexibility. Work rolls are backed by a multiple system of individually adjustable back-up rollers, and, combined with simultaneous roll bend and longitudinal and radial tilt, provide area pressure control on any section of the work. Compact and trouble-free, Voss Roller Levelers are engineered to level hot or cold-rolled sheet, coil, strip or plate as well as non-ferrous metals. Let us demonstrate the advantages leading steel producers are enjoying through the use of Voss Inverted Roller Levelers.

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Savings

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die material cost	$63
tooling time	45 hours!
set-up time	10 minutes!

over 5000 pieces per day!
(hand feed, 8x6", 20 ga. CRS)

Now you can benefit from economy tooling for compound, progressive and other types of tool designs.

Parts are produced in any gauge or material by means of Templet tooling processes — at substantial savings.

Submit prints for quotations

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INDUSTRIES INCORPORATED
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701 Atkins Ave., Brooklyn, N. Y.

The Templet Process (Pat. Nos. 2,495,221 and 2,850,096) is also available for use in your own shop. Now licensed to more than 150 major U.S. manufacturers. Write for details.

COMING EXHIBITS

Metal Show—Oct. 27-31, Public Auditorium, Cleveland. (American Society for Metals, 7301 Euclid Ave., Cleveland 3.)

Plastics Show—Nov. 17-21, International Amphitheater, Chicago. (The Society of the Plastics Industry, Inc., 250 Park Ave., New York 17.)

Power & Mechanical Engineering Show—Dec. 1-5, New York Coliseum. (International Exposition Co., 480 Lexington Ave., New York 17.)

MEETINGS

OCTOBER

Conveyor Equipment Manufacturers Assn.—Annual meeting Oct. 18-21, Greenbrier Hotel, White Sulphur Springs, W. Va. Society headquarters, One Thomas Circle, Washington 5, D. C.

American Coke & Coal Chemicals Institute—Annual meeting, Oct. 20-21, Greenbrier Hotel, White Sulphur Springs, W. Va. Society headquarters, 711 14th St., N. W., Washington, D. C.

Rail Steel Bar Assn.—Semi-annual meeting, Oct. 20-22, Blackstone Hotel, Chicago. Society headquarters, 38 S. Dearborn St., Chicago.

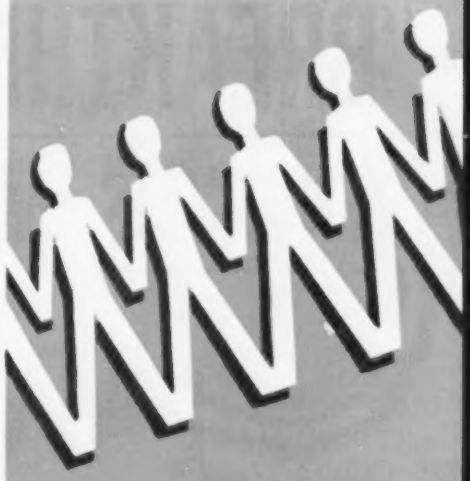
American Society of Body Engineers — Annual technical convention, Oct. 22-24, Rackham Memorial Bldg., Detroit. Society headquarters, 100 Farnsworth, Detroit.

American Gear Manufacturers Assn.—Semi-annual meeting, Oct. 26-29, Edgewater Beach Hotel, Chicago. Society headquarters, One Thomas Circle, Washington D. C.

American Institute of Steel Construction, Inc.—Annual convention, Oct. 26-30, Greenbrier Hotel, White Sulphur Springs, W. Va. Society headquarters, 101 Park Ave., New York.

National Lubricating Grease Institute—Annual meeting, Oct. 27-29, Edgewater Beach Hotel, Chicago. Society headquarters, 4638 J. C. Nichols Parkway, Kansas City, Mo.

(Continued on P. 16)



UNIFORMITY

If you've had disappointing variations in monthly control of blast cleaning costs—try Malleabrasive.

Malleabrasive has the uniformity of metallurgical structure from one lot to the next that has leveled out the cost chart line in many of America's largest foundries and other metal working plants. Not only leveled—but lowered!

The full and complete Malleabrasive process itself—used by ourselves exclusively—provides a degree of uniformity unmatched in the metal abrasive field.

Whatever your blast cleaning job, Malleabrasive will do it well, and will repeat uniformly, from month to month. Write us for information.

NOW IN 50 LB. BAGS



MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO.
Mansfield, Ohio

Sold by Pangborn Corp., Hagerstown, Md. and by many leading distributors of foundry supplies from coast to coast.

"BREAKTHROUGH"—"DYNAPAK"

SYNONYMS IN ADVANCED METAL WORKING



Metallurgists and tool engineers have achieved success in their search for a versatile, practical machine for extruding, forming, and forging tomorrow's high-strength metals and alloys.

A breakthrough was at hand when it was discovered that many of these metals exhibit hydrodynamic behavior when they are worked at very high velocities, with high rates of energy application.

For example, where an extrusion process normally is performed at velocities of 1 to 5 fps and at pressures to 175,000 psi, high energy extrusion takes place at velocities to 200 fps and at pressures of 250,000 psi and above.

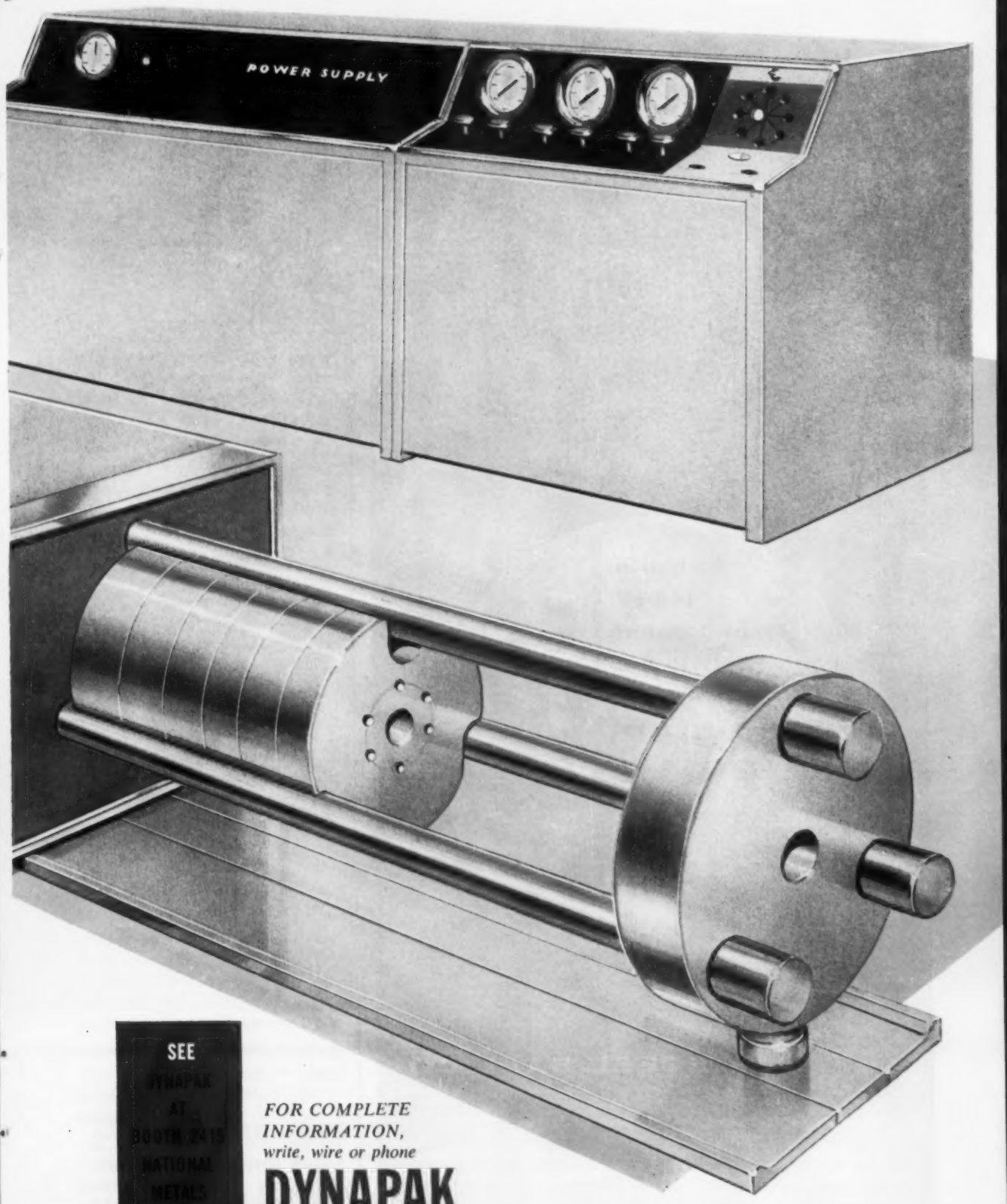
While the phenomena of high energy forming characteristics of metals are not yet fully understood, it is known that metals so formed exhibit increased flow with little or no spring back.

But the real breakthrough could not occur until science had perfected machines that could generate these velocities and pressures in a safe and practical manner, to produce end-products of high physical and dimensional integrity.

SUCH A BREAKTHROUGH IS DYNAPAK.

DYNAPAK

DYNAPAK is a pneumatically energized machine that develops velocities to 500 fps and controls them to ± ½ fps... **DYNAPAK** is a versatile multi-purpose machine that can forge, extrude, or form, and can be readily converted from one process to another... **DYNAPAK** develops 40,000 foot-pounds of energy in a 6 inch machine that is less than 2 feet square and 10 feet long, weighs 3000 pounds and can literally be bench mounted. A 36 inch **DYNAPAK** generates 1,500,000 foot pounds of energy... **DYNAPAK** is attractively packaged—can be utilized in clean manufacturing areas... **DYNAPAK** produces parts that can not be produced in any other way, because the extremely high pressures literally force metal into every crevice of the die. **DYNAPAK** extrudes web thicknesses to one-hundredth of an inch—forges to zero draft angle—produces exceptionally good surface finishes... **DYNAPAK** is equally applicable with today's materials and production problems, and involves extremely low initial investment... **DYNAPAK** is more than a new machine, or a means of implementing a new concept. It is in itself a totally new concept—a new philosophy. **DYNAPAK** IS SAFE (no explosives are used), VERSATILE, PRACTICAL, OPERATIONAL.



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AT
BOOTH 2415
NATIONAL
METALS
EXPOSITION
CLEVELAND
OCT. 27-31

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CONVAIR A DIVISION OF GENERAL DYNAMICS CORPORATION

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EXHIBITS, MEETINGS

(Continued from P. 13)

Ultrasonic Manufacturers Assn.—Annual meeting, Oct. 28, Hotel Cleveland, Cleveland. Society headquarters, 271 North Ave., New Rochelle, New York.

Metal Treating Institute — Annual meeting, Oct. 29-31, Hotel Cleveland, Cleveland. Society headquarters, 271 North Ave., New Rochelle, New York.

NOVEMBER

Grinding Wheel Institute — Semi-annual fall meeting, Nov. 5-7, Statler Hotel, Buffalo, N. Y. Society headquarters, 2130 Keith Bldg., Cleveland.

National Metal Trades Assn.—Biennial convention, Nov. 5-7, Hotel Commodore, New York. Society headquarters, 337 W. Madison St., Chicago.

National Machine Tool Builders' Assn.—Annual meeting, Nov. 5-7, The Homestead, Hot Springs, Va. Society headquarters, 2071 E. 102nd St., Cleveland.

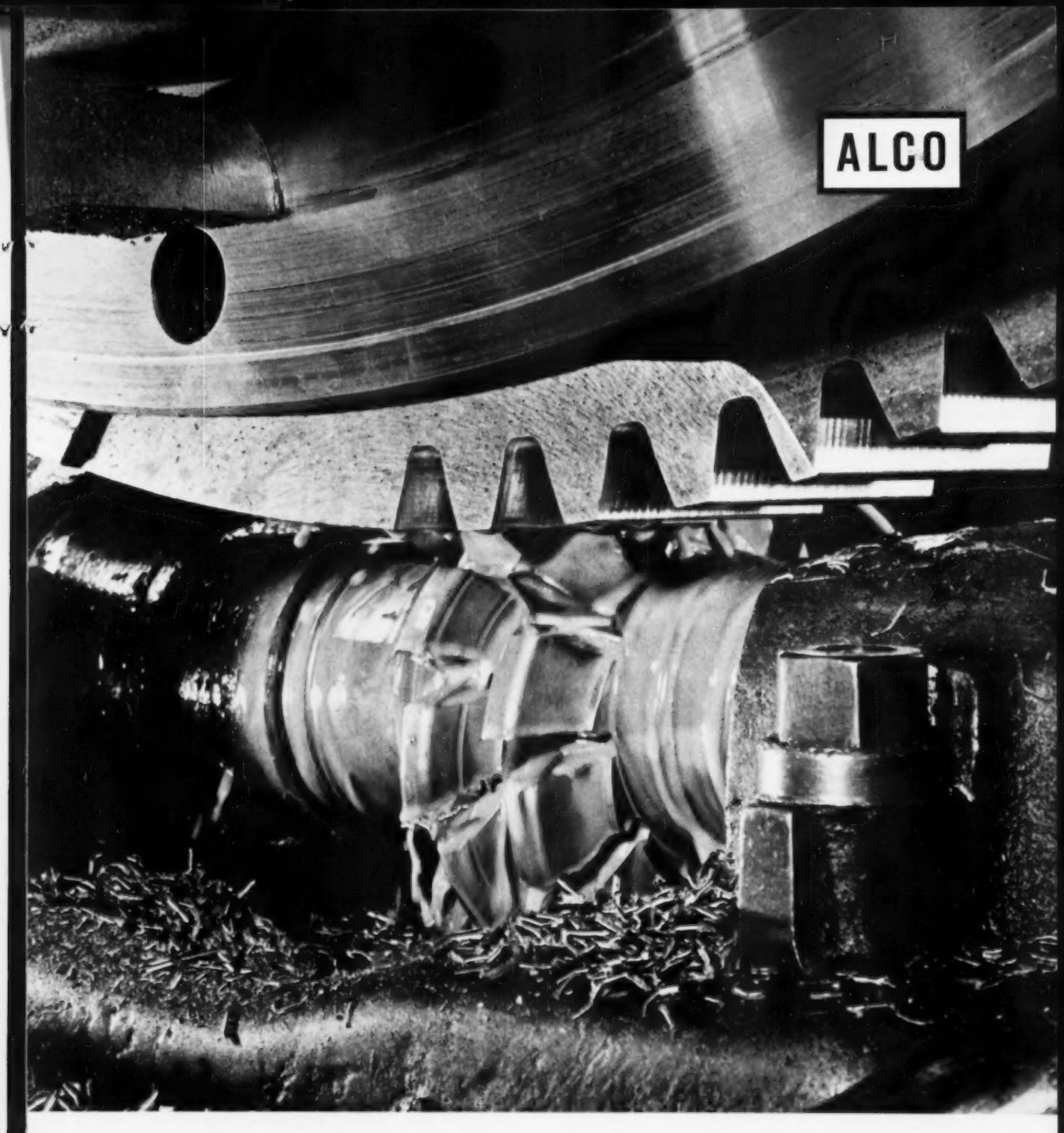
Industrial Management Society—Annual national industrial engineering and management clinic, Nov. 5-7, Sherman Hotel, Chicago. Society headquarters, Suite 1310, 330 S. Wells St., Chicago 6.

National Tool & Die Manufacturers Assn. — Annual convention, Nov. 5-9, Sheraton Hotel, Philadelphia. Society headquarters, 907 Public Square Bldg., Cleveland.

Steel Founders' Society of America—Technical & Operating conference, Nov. 10-12, Carter Hotel, Cleveland. Society headquarters, 606 Terminal Tower, Cleveland 13.

National Electrical Manufacturers Assn. — Annual meeting, Nov. 10-13, Hotel Traymore, Atlantic City, N. J. Society headquarters, 155 E. 44th St., New York.

Electric Overhead Crane Institute—Engineering committee meeting, Nov. 13-14, Sherman Hotel, Chicago. Society headquarters, One Thomas Circle, Washington 5, D. C.



A new opportunity for machining cost reductions...

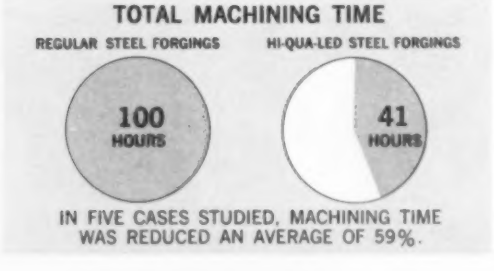
If your ratio of machining cost to material cost is more than 1 to 1, you can profit by using . . .

ALCO'S HI-QUA-LED STEEL FORGINGS

ALCO's easy-to-machine Hi-Qua-Led Steel® forgings are speeding up production and cutting costs on machining jobs throughout industry. While retaining all the desirable mechanical properties of regular steel in any AISI grade, ALCO's special-process leaded steel forgings provide opportunities for significant cost reductions in three important areas: machine time, tooling and surface finish.

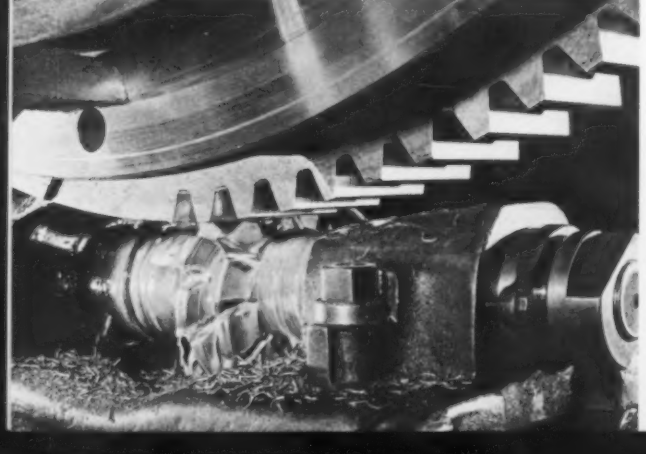
COST REDUCTION NO. 1

HI-QUA-LED STEEL REDUCES MACHINE TIME



The lead additive in ALCO's Hi-Qua-Led Steel forgings tends to lubricate the cutting action of tools. This permits heavier cuts and higher cutting speeds for faster removal of metal. As a result, many users have made significant cost reductions by cutting machining time more than 50%.

8-HOUR JOB DONE IN 3—One manufacturer reports that roughing and finishing a gear formerly required 8 hours and 8 minutes. With the freer machining Hi-Qua-Led Steel and the increased speeds it permits, the job is now done in 3 hours.



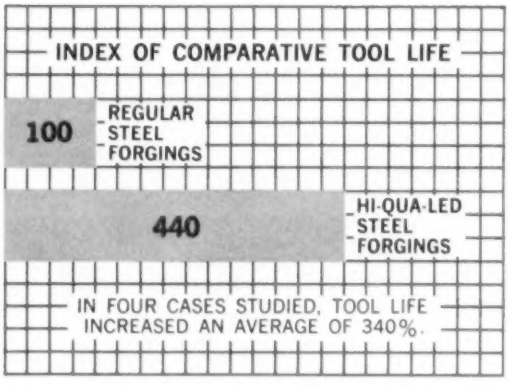
TOOL DOES 3-TIMES THE WORK—Lower frictional properties of Hi-Qua-Led Steel forgings enable another manufacturer to obtain 10 pieces per tool grind as compared to 3 pieces with non-leaded steel. And surface finish is also greatly improved.



ALCO

COST REDUCTION NO. 2

HI-QUA-LED STEEL INCREASES TOOL LIFE



The reduced friction characteristic of Hi-Qua-Led Steel forgings also provides outstanding opportunities for increased tool life. Leading manufacturers report increases of 200%, 700%, even 1600%. With friction sharply reduced, tools operate at lower temperatures. As a result they cut more efficiently, require fewer grinds, and tool breakage is practically eliminated.

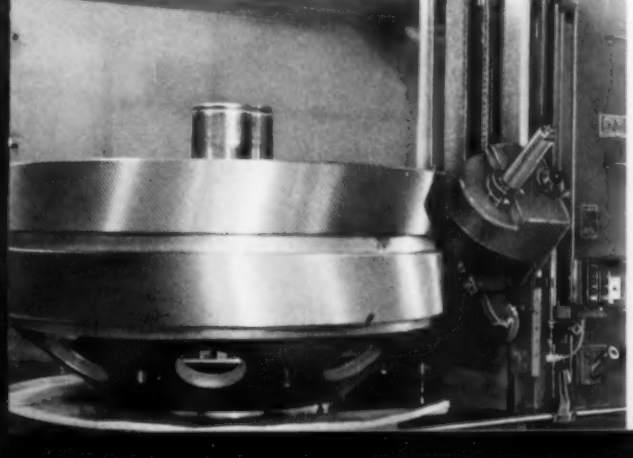
COST REDUCTION NO. 3

HI-QUA-LED STEEL GIVES SUPERIOR SURFACE FINISHES

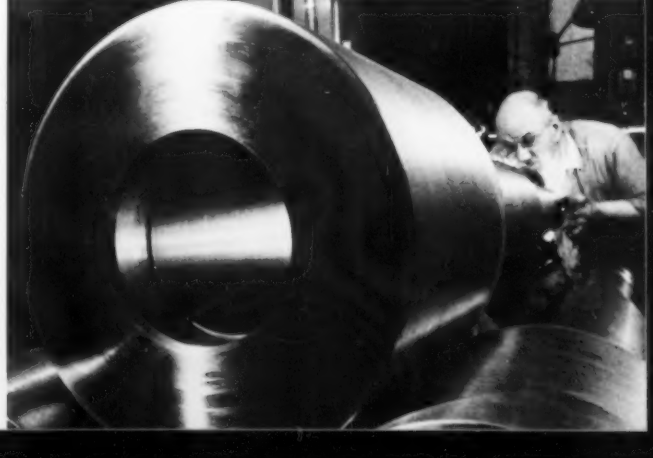


ALCO's Hi-Qua-Led Steel forgings assure cleaner cuts and better chip formation resulting in much smoother surface finishes. For some jobs a roughing tool may be used to obtain the desired finish. This superior machinability also assures much closer tolerances.

SAVES FULL WORK WEEK—The improved machining qualities of Hi-Qua-Led Steel forgings have reduced gear cutting time for another manufacturer. A job that formerly required 65 hours is now completed in 25, thus saving a full work week.

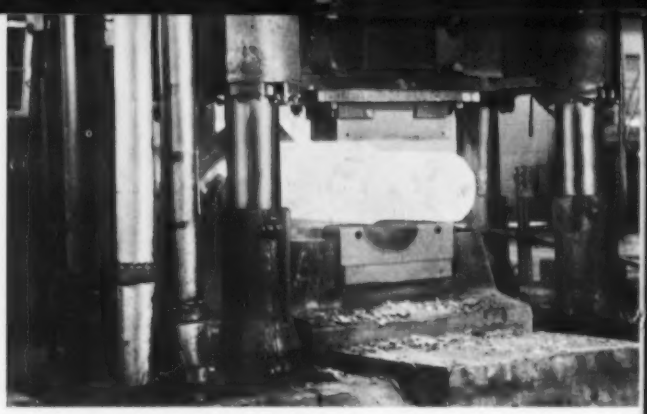


TOOL LIFE EXTENDED 700%—In a trepanning operation, a manufacturer reports tool life increased from one to eight pieces with Hi-Qua-Led Steel forgings. Tools operate at greatly reduced temperatures and provide better chip formations.

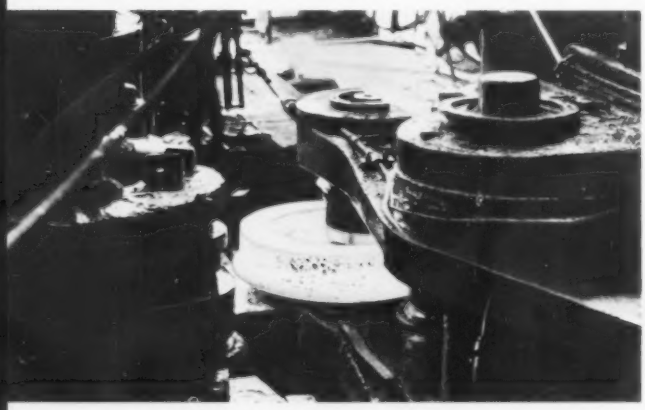




STEELMAKING—To assure highest-quality forgings, ALCO makes its own steel—to customer specifications—in either regular or Hi-Qua-Led grades, or austenitic stainless.



FORGING—With uniform temperatures throughout, ALCO ingots are forged to rigid standards of forging reduction for proper grain refinement and dense, uniform structure.



ROLLING—Hundreds of different rolls make possible an almost unlimited variety of cross-sections for ALCO ring forgings. Mandrelled ring forgings are also available.



MACHINING—ALCO forgings are normally supplied in rough-machined condition but can be shipped finish-machined if specified. ALCO makes shafts up to 40-ft long, rings up to 12-ft in diameter.

FROM STEELMAKING...THROUGH ROUGH MACHINING ALCO BUILDS QUALITY INTO EVERY FORGING

Completely integrated production of ALCO forgings means better quality control. That's why ALCO *makes its own steel* . . . and why you are assured a quality product in exact conformance to your specifications.

Sizes range from 18 to 145 in. OD for circular forgings; 1000 to 30,000 lb for open-die; and up to 60 in. wide for mandrelled ring forgings.

For complete information on the cost reductions possible with ALCO forgings, contact your nearest ALCO sales office or write ALCO Products, Inc., Dept. 156, Schenectady, N. Y.

SEE FOR YOURSELF

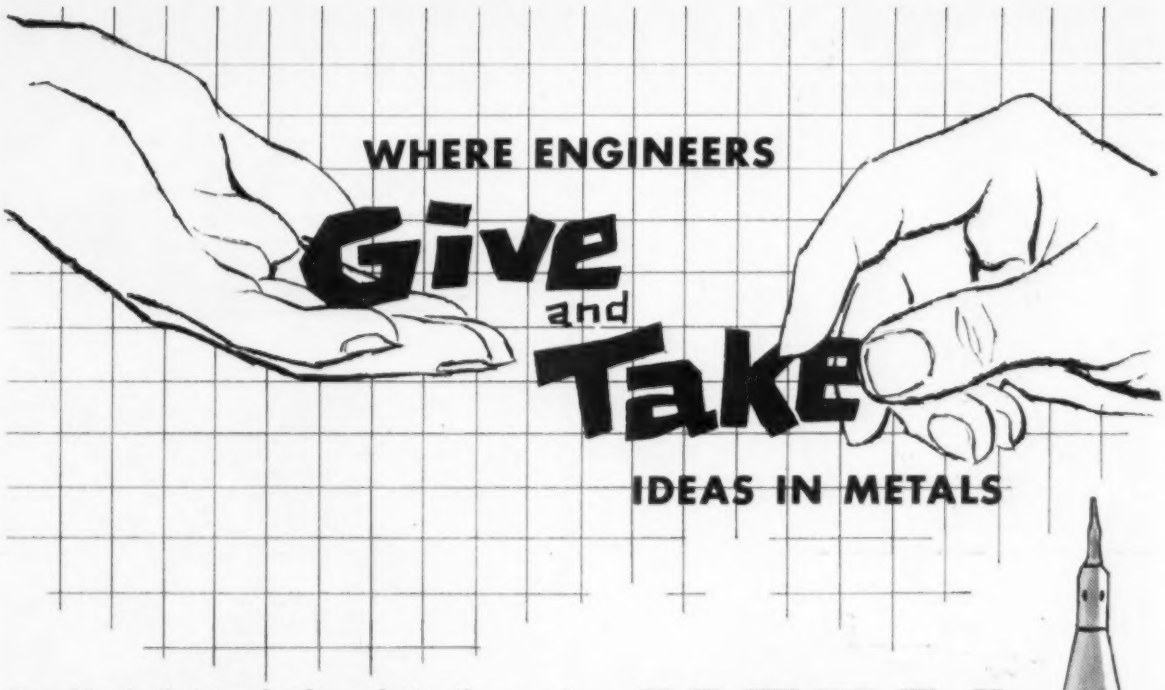
AT THE METAL SHOW, where ALCO will machine Hi-Qua-Led Steel forgings and demonstrate the cost reductions possible. Booth 2207, ALCO Exhibit.

OR, IN YOUR OWN PLANT, where ALCO will be glad to work with you in arranging a test on your own machines.

ALCO

ALCO PRODUCTS, INC.
NEW YORK
SALES OFFICES IN PRINCIPAL CITIES

LOCOMOTIVES · DIESEL ENGINES · NUCLEAR REACTORS · SPRINGS · STEEL PIPE · FORGINGS · OIL FIELD EQUIPMENT



The old rule that two heads are better than one is expanded many times over at the annual METAL SHOW where literally hundreds of the finest minds in the industry congregate to exchange new ideas and concepts. At the inspiring exhibits and in thought-provoking technical sessions, Metals Engineers, Designers, Administrators and Production Chiefs teach and learn simultaneously in the friendly "give and take" of information concerning their industry.

Today, as never before, the METAL SHOW is a must! Don't miss it. You'll come away stimulated and enlightened . . . better equipped to meet the challenges of an ever more complex and competitive metal market.

There's still time... **to be an exhibitor at the METAL SHOW. Show Engineers how your product or process can help MAKE IT BETTER FOR LESS . . . WITH METALS. Call collect for details.**

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OCTOBER 27-31

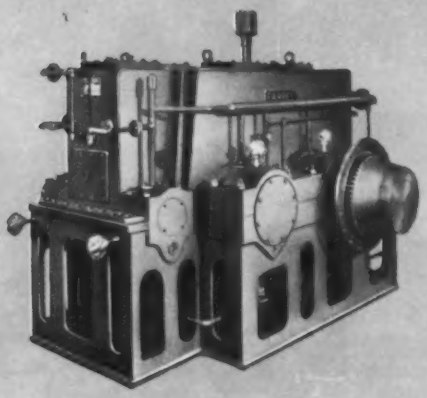


NATIONAL METAL CONGRESS and EXPOSITION

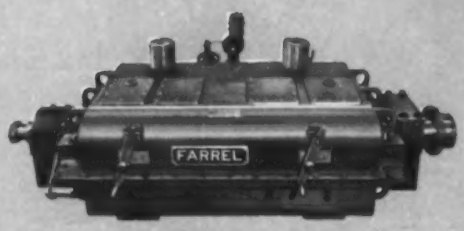
Owned and Operated by the **AMERICAN SOCIETY FOR METALS**

7301 Euclid Avenue • Cleveland 3, Ohio

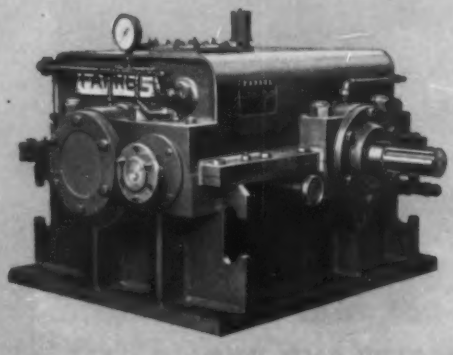
Cooperating Activities: Institute of Metals Division . . . Iron and Steel Division . . . Extractive Metallurgy Division of the American Institute of Mining, Metallurgical and Petroleum Engineers . . . Society for Nondestructive Testing, Inc. Associations presenting technical sessions in cooperation with ASM: Industrial Heating Equipment Association; Metal Powder Industries Federation; Metal Treating Institute; Special Libraries Association, Metals Division; and the extensive programs of the American Society for Metals with the new Bill Woodside Memorial Sessions, and ASM Metallurgical Seminar.



Special reversible, high-speed reduction unit, 8,000 HP, 18,000/1,295.5 RPM.



Special four-speed, in-line, cradle-mounted gear unit, 450 HP, 1,500/3,500 RPM input, ratios 1.20, 1.694, 1.939 and 1.475.



Special right-angle, speed-increasing unit, 600 HP, 2,500/19,932 RPM, with double helical and spiral bevel gears.



Special speed-increasing unit, 660 HP, input speed range: 1,500 to 3,000 RPM, output speed range: 20,000 to 40,000 RPM.

MEET YOUR TEST-STAND NEEDS

with an individually engineered high-speed unit

Each of the above gear units embodies the solutions to a whole series of problems – presented by the customers' individual requirements, and by the high peripheral speeds involved. Each is a challenge in itself.

That such units can be designed for successful operation is due to (1) Farrel's long experience in meeting "extraordinary" specifications for gear units, and (2) the inherent accuracy of the Farrel-Sykes method of gear generation.

The next time you are in the market for a test-stand unit, call Farrel. In the meantime, send for a copy of bulletin 451.

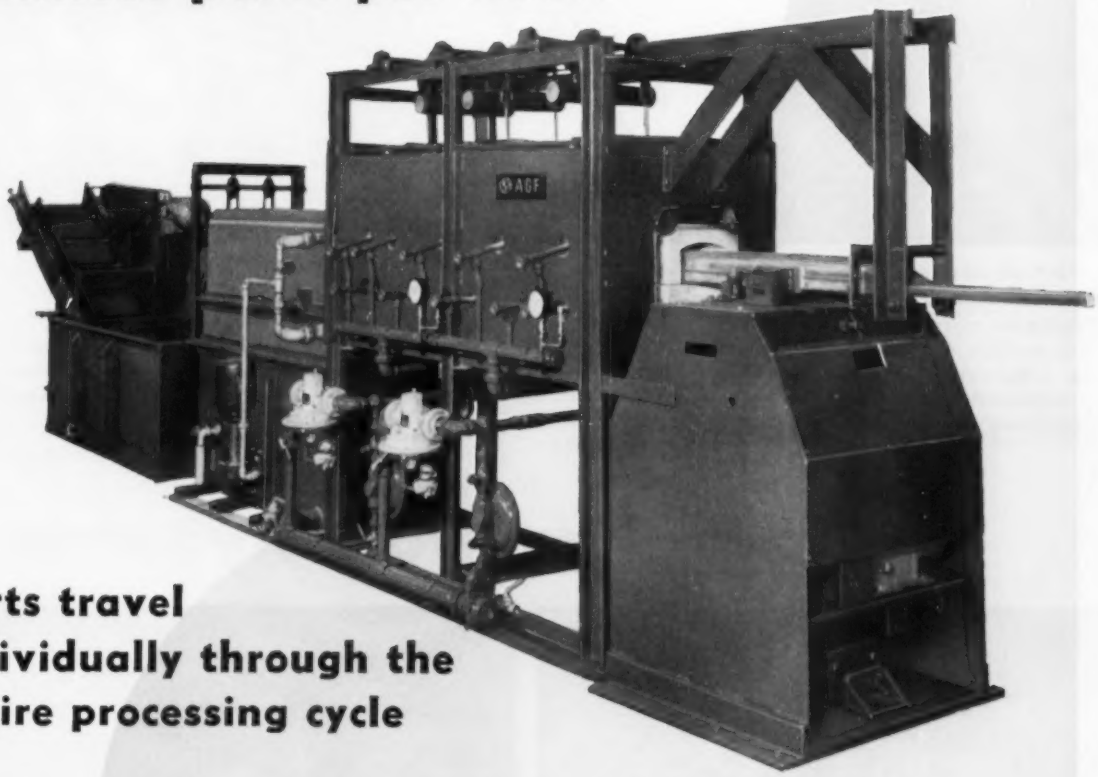
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
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Farrel-Birmingham®

FB-1149

Consistent Uniformity as you Bright Harden and Bright Anneal at 1850° — 100 pounds of stainless parts per hour!



Parts travel individually through the entire processing cycle

This new Shaker Hearth employs an alloy muffle which incorporates a purging, heating and water-jacketed cooling section, and seals into an automatic conveyorized oil tank.
Among the many operational advantages of this new line of Reciprocating Furnaces, are the maintenance of —80° to —90° F. dew points . . . complete atmosphere uniformity throughout the processing cycle . . . and a very low consumption of atmosphere gas . . . Batch purging, heating and cooling are eliminated . . . and the parts may be observed throughout the entire processing cycle through openings in the charge and discharge ends of the muffle.

Write for Equipment Catalog #8A.

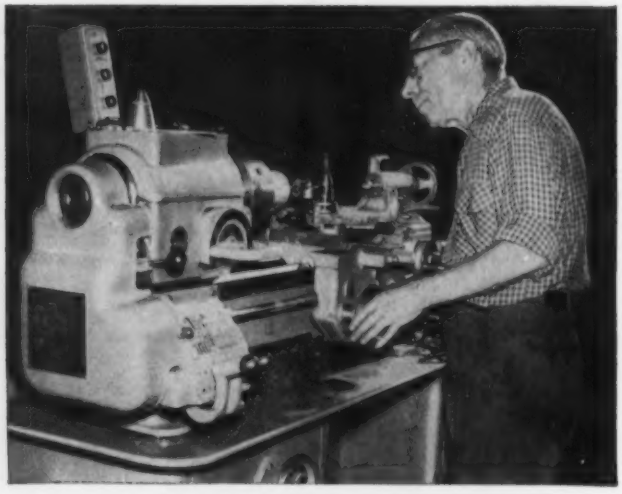
AMERICAN GAS FURNACE CO.
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"Pioneers since 1878"

Be sure to see our latest improved machine at Booth No. 2027 Cleveland Metal Show, Oct. 27-31

DELTA INDUSTRIAL



DELTA 20" DRILL PRESSES are built to give you machine tool production capacity with power tool flexibility. Massive construction and rugged power make the Delta 20" a heavy-duty tool. Available with hand or power feed, choice of No. 2 or No. 3 Morse taper spindle. 28 models include floor, bench, multiple spindle and overhead types. Production tables, heads and columns available as components.



DELTA 11" METAL LATHES offer exclusive Delta Quality features such as massive head stock construction, perfected variable speed drive, unique 4-position drive selector and many more. Both 4 ft. and 5 ft. bed models available with flame hardened bed. And you get the double versatility of a ram-type turret lathe, when you add production accessories for precision multiple machining jobs.

A proved way to cut your costs

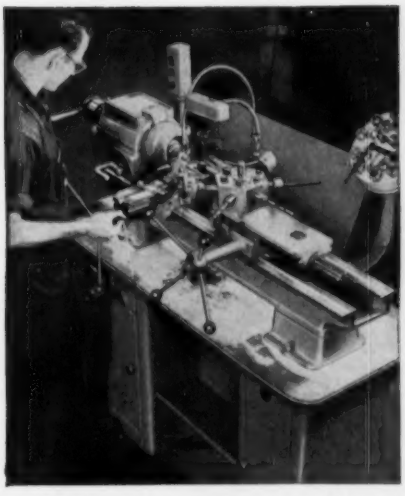


DELTA 17" DRILL PRESSES in over 70 models enable you to make your own single or multiple spindle set-up for drilling, counterboring, reaming and tapping jobs. Finest in their class, they are engineered for precision work and built for long life with low maintenance costs. Standard or power feed, high or slo speed and key chuck or tapered spindle available in floor, bench and multiple spindle models.

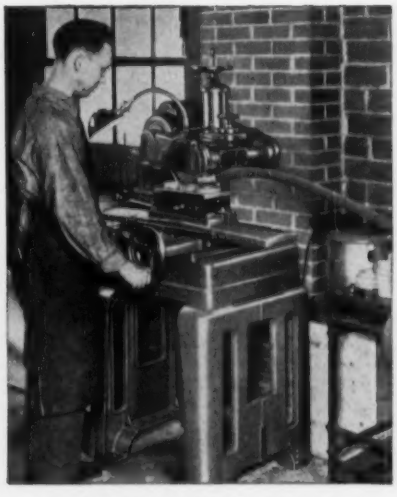


DELTA CUT-OFF MACHINES for fast, smooth, accurate cuts are speeding production and improving quality in tool rooms, maintenance departments and on production lines. Work head pivots for easy mitering. All belts, pulleys, cutting wheels or blades are fully enclosed for maximum safety. Whether you do wet abrasive or dry abrasive cutting, or cut non-ferrous metals or wood—you choose the model that's right for your job.

PRODUCTION TOOLING



DELTA HAND SCREW MACHINES fill the production gap between standard engine lathes and expensive, automatic screw machines . . . and at lower cost than *any* comparable machine. Bed turret, double tool post cross slide and lever type collet closer are *standard equipment*. Delta Quality features throughout assure lasting precision on multiple machining jobs.

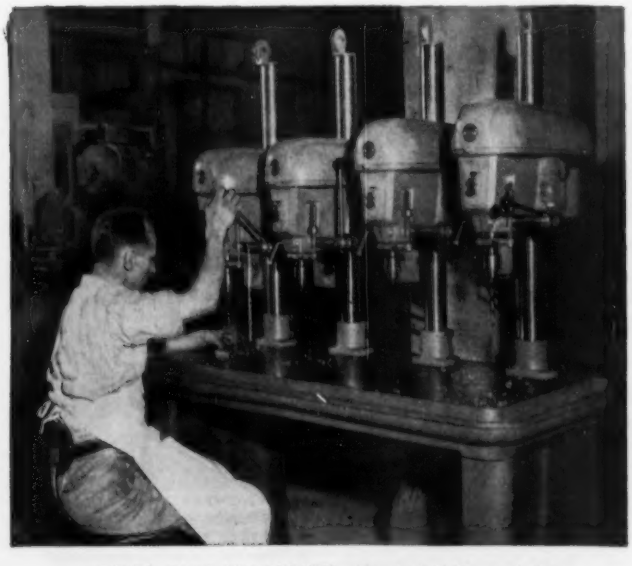


DELTA TOOLMAKER® GRINDERS perform three precision grinding operations—surface, chip breaker and tool and cutter grinding. And with Delta 6" tool grinders, 7" standard grinders and 2½" belt grinders you have a complete line of safe, accurate, low cost grinders for *every* shop need.



DELTA 14" BAND SAWS These versatile, low cost machines give you eight cutting speeds—ranging from 40 fpm for metal to 3000 fpm for wood—using a *standard* motor. They enable you to cut stainless steel, armor plate, high speed steel, cast iron, alloy steel and dozens of other materials including woods and plastics. Available with steel or cast iron stand.

on every metalworking job



DELTA 15" DRILL PRESSES offer such Delta exclusives as six spindle adapters, "universal" hand feed, counterbalanced belt guard . . . plus big, machine tool ruggedness and proven production dependability. Delta 14" utility and 14" Super-Hi Sensitive Drill Presses also available in many models.

See Delta Industrial Tools at your nearest Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

Thousands of metalworking plants across the country are cutting costs by using Delta Industrial Tools to supplement or replace expensive, special-purpose machines. Here's why: Delta tools are ruggedly built to withstand hard, continuous wear—they offer precision performance to meet the highest production standards—yet they cost less to buy, less to operate, and less to maintain. Completely portable, Delta tools can be moved in and out of production lines to relieve bottlenecks. And any plant can have inexpensive, automated operations through the combination of versatile, standard Delta components and automatic control devices.

Because Delta is the world's most *complete* line, you can choose the *right* tools for the biggest savings on *your* jobs.

Get all the facts on how YOU can cut costs with Delta Industrial Production Tooling. Write for FREE Delta Industrial Catalog to: Rockwell Manufacturing Co., Delta Power Tool Div., 640K N. Lexington Ave., Pittsburgh 8, Pa.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL



Biggest news in years—for band saw users...

NOW Victor BLADES

come packaged in NEW easy-to-use REEL-PAC dispenser...

You get much more—at no extra cost—when you buy Victor Band Saw Blades. Each 100-foot blade comes in a strong, plastic Reel-Pac—the handiest way to package blades you ever saw.

A special shield keeps the reel free-running—protects hands and package from blade teeth. Blade tension won't cause distortion or blade fouling. You can easily slide back any extra blade after you've measured off what you want.

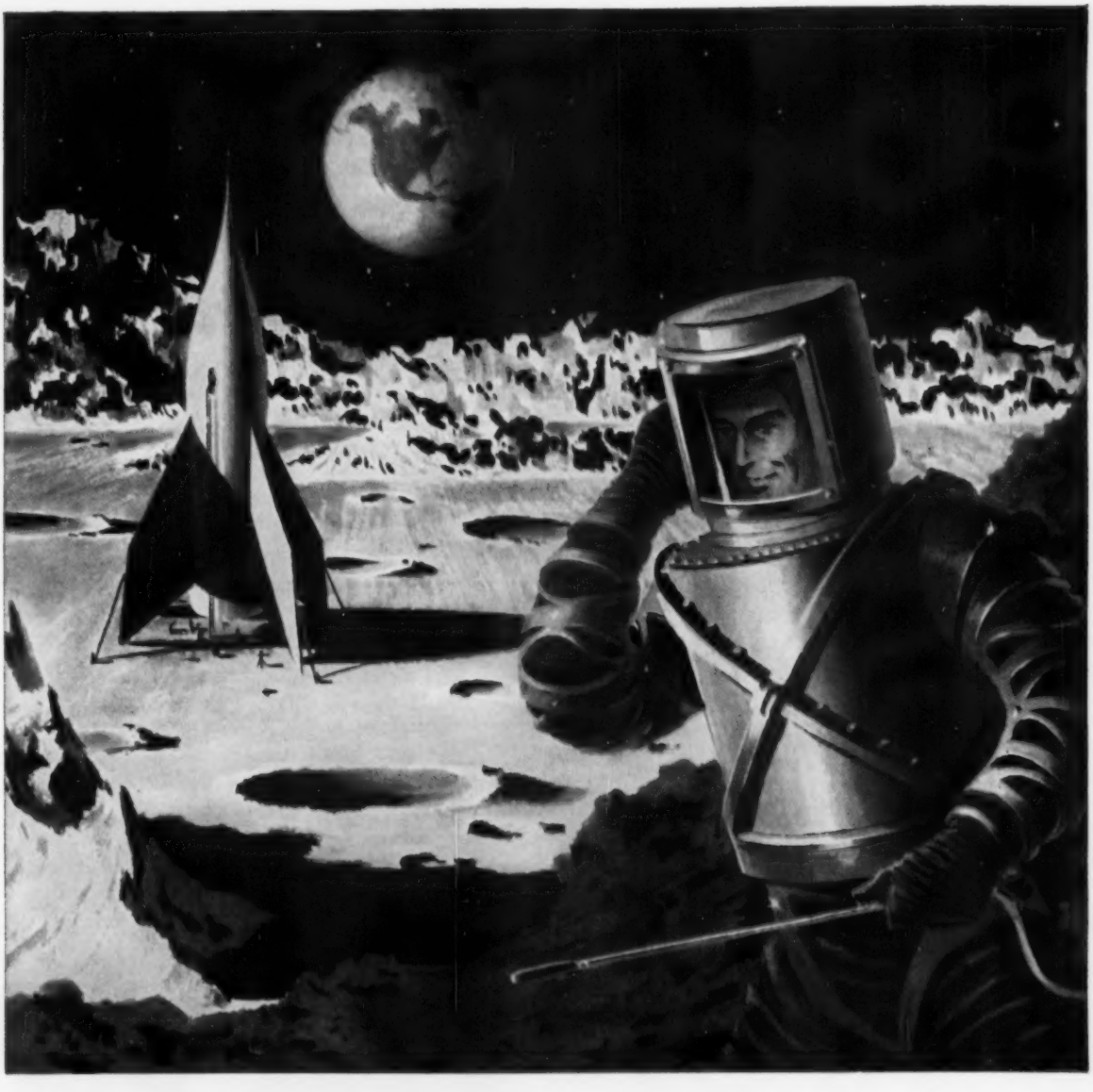
Victor Outline Flexible Back, Gored Tooth and Skip Tooth Blades, clearly labeled with type and size, now come in Reel-Pac dispenser in sizes up to and including ½". Your Victor distributor has them now. See him soon.



VICTOR SAW WORKS, INC.
Middletown, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades

1800



Even out there, a friendly voice

How lonely he'll be—that first man to touch the silent, ominous surface of the moon! What shred of hope would he have, were it not for that reassuring contact with home right there in his hand?

There is now no doubt that radio contact can be maintained between the Earth and our moon pioneers. The friendly voice from home will come through clear and comforting, thanks partly to improvements in electrical insulations being made today by CDF.

FOR SPECIFIC INFORMATION on any CDF insulating material, see Sweet's, Electronics Buyers Guide, and other directories. Then send us your print or your problem, and we'll recommend the proper material for your application.

CDF MAKES Dilecto Laminated Plastics • Di-Clad* laminates for printed circuits • Celoron and Polyester-Glass Molded Plastics • Micabond Mica Products • Diamond Vulcanized Fibre and Vulcoid • Flexible Tapes of Teflon†, Silicone, and Micabond.

Complete Fabrication Facilities.

*Trademark of Continental-Diamond Fibre
†duPont trademark for its TFE-fluorocarbon resin.

CDF **CONTINENTAL-DIAMOND FIBRE**

A SUBSIDIARY OF THE Bondstock COMPANY • NEWARK 85, DEL.


NEW

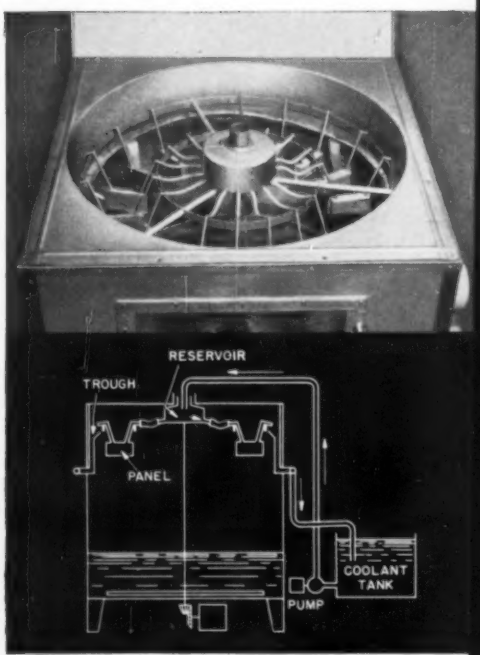
from Standard Oil THE MAGIC BOX

Corrosion steals $5.5 billion from industry annually. Standard Oil is in the forefront of the fight to control this loss. Standard's research scientists have developed a new method for measuring the effectiveness of rust preventives. This new test takes less than one-twentieth of the time of previous tests—and is about three times as precise.

Using a controlled humidity cabinet for testing corrosion, these Standard research men installed a system for cooling metal test panels (previously treated with rust preventive) so that their surface temperatures are lower than the temperature in the cabinet. Temperatures of panel surfaces and of cabinet atmosphere are held accurately. Controlling the temperature of the panels controls the rate at which water condenses on them. This in turn (for the first time) permits accurate control of the amount of condensation on the panels. Rust preventives are more speedily and precisely tested. Science, as a result of this work, has a new tool with which to test corrosion.

This is the research pay-out industry receives from Standard Oil. This is the something extra that backs up the Standard Oil industrial lubrication specialist who calls on you. This is the something extra found in the products he has to sell.

To know more about how Standard Oil industrial lubrication specialists—and Standard's research program—can help you, call the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



Top view and cross section of Accelerated Corrosion Test cabinet.

You expect more from STANDARD and get it!



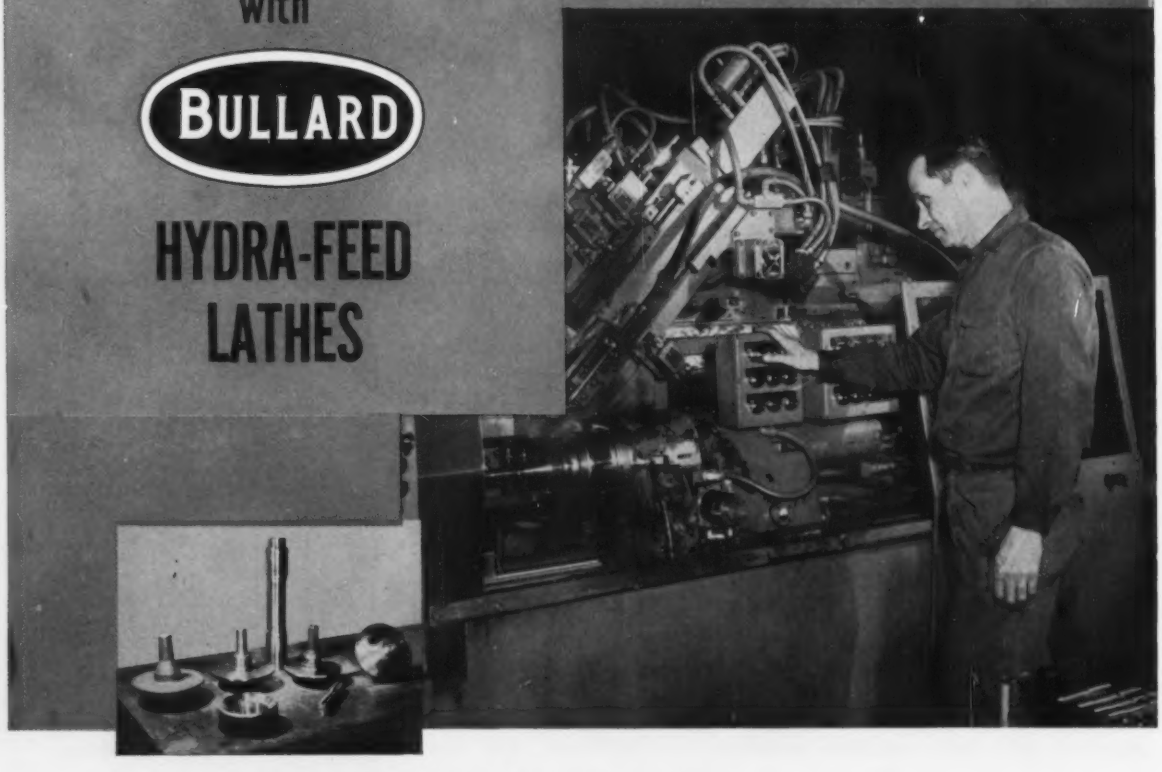
Edgar A. Dieman, Standard Oil scientist, inventor of a new Rust Preventive System, inspects metal panel that has been tested in humidity cabinet.

INCREASE PROFITS by REDUCING COSTS with

BULLARD

HYDRA-FEED LATHES

The experience of The National Supply Company, Toledo, Ohio, manufacturers of oil field machinery, as related by Mr. Owen U. Trumbull, Tool Engineer, can be applied to improve your profit picture.



Their BULLARD HYDRA-FEED TRACER LATHE . . .

- ★ Replaced four machines previously used
- ★ Reduced machining operations from ten to four
- ★ Held work to closer tolerances
- ★ Decreased spoilage
- ★ Simplified tooling and set-up

These are all factors that have a direct bearing on profits

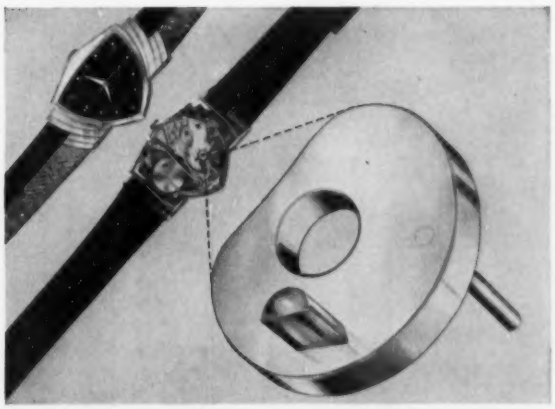
The BULLARD COMPANY

Bridgeport 9, Connecticut

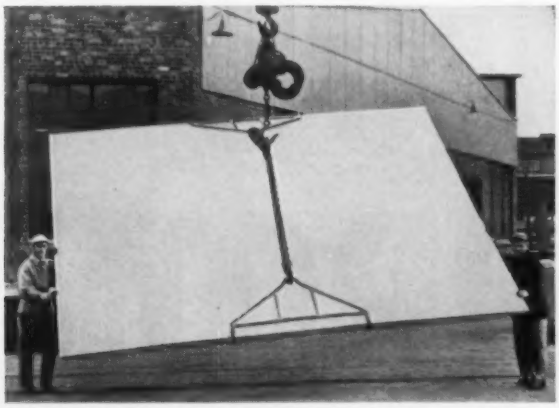
Remember . . . to cut costs when cutting metal . . . Buy BULLARD

1/7000 OF AN OUNCE or

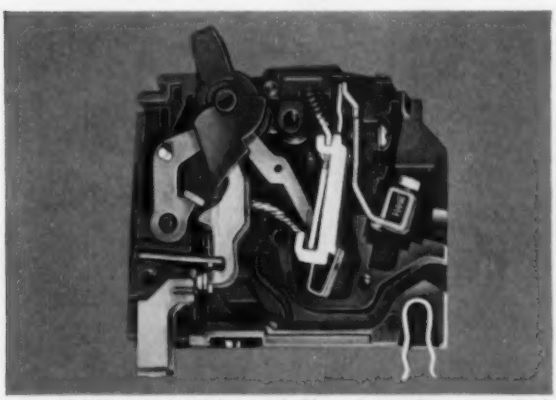
7 tons. In metals, it's the right combination of properties that counts. So just specify the properties you need. You may find the answers from Anaconda very interesting.



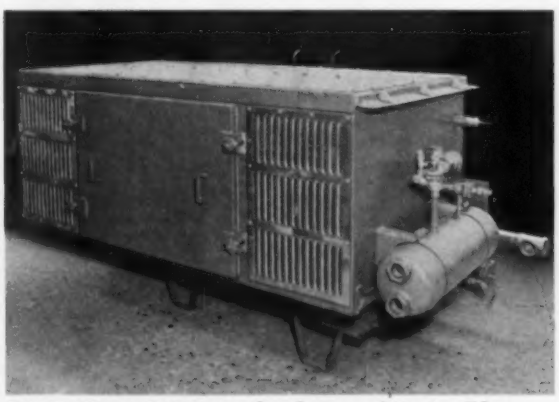
HAMILTON WATCH CO., for the world's first electric wristwatch, demanded these qualities in metal for a vital 1/7000-ounce indexing roller – high hardness and tensile strength; ease of blanking, machining; nonmagnetic properties. Anaconda Ambraloy-901 met the need perfectly. The magnified pinhead-size assembly shown above has a half-round sapphire jewel. The pin limits balance motion.



ALLIS-CHALMERS – building what may be the world's largest surface condenser for Commonwealth Edison Co. – needed tube sheets which combined strength and corrosion resistance with machinability. The answer was Anaconda leaded Muntz metal – 4 plates, each 13' x 17', 1½" thick, weighing over 7 tons. When drilled, plates support 21,960 tubes, for 200,000 square feet of condensing area.



SQUARE D COMPANY needed low electrical resistance, high spring properties, fatigue resistance in critical parts (in color above) of their QO circuit breaker. Electrical resistance of ordinary phosphor bronzes was too high. So was the cost. Engineers of The American Brass Company suggested Anaconda Ambronze-474 and Square D found it had the right combination of properties for the need. And this metal provided superior forming and lower material costs.



THE TRANE COMPANY'S railroad air-conditioning "dry-wet" combination condensers are mounted under cars – facing severe corrosive conditions and a beating from roadbed gravel and stone. Exposed metal, including casing, liquid receiver, 170-gal. water tank, must have superior corrosion resistance, high strength and toughness. Trane has found Everdur®, Anaconda's group of copper silicon alloys, meets its needs. And Everdur is easy to fabricate.

Starting with 93 standard alloys, The American Brass Company can make minor variations in composition, fabrication, and annealing to provide an almost unlimited number of combinations of useful properties. When new or unusual problems rise, ask for the help of the Technical Dept. in selecting the right metal. For such help or a copy of Publication B-32, "Anaconda Copper & Copper Alloys," write: The American Brass Company, Waterbury 20, Conn. 8684

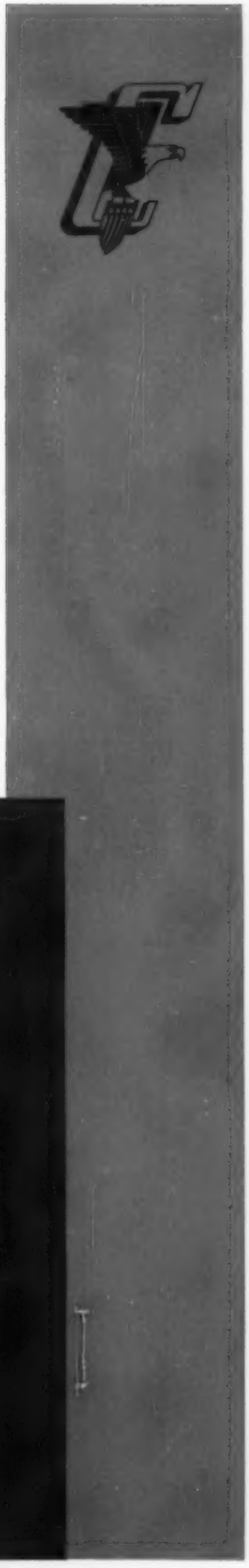
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Made by The American Brass Company

CARPENTER DOUBLES PRODUCTION CAPACITY

STEEL



behind the news . . . this unprecedented move:

In a nation famed for its mass-production techniques, it is rare to find the company whose chief problem for almost 70 years has been one of *supply* rather than *demand*.

Yet the industry requirements for *Carpenter*-quality specialty steels have, in times of normal economy . . . always exceeded *Carpenter's* ability to produce.

In contrast to the giants of the steel world . . . the steels of battleships, bridges and buildings . . . *Carpenter* history is one of precision rather than might—fine quality for critical applications, rather than mammoth quantity.

Today, as the result of long-planned expansion and new acquisitions, we can offer *quantity* along with famous *Carpenter quality*. Both are now available and will continue to be available, even in times of peak demand.

While *quality* will continue to remain a sacred watchword, we will continue to lead the way and grow apace of the ever-increasing demands of atomic-age industry for the world's finest steels.

tool and die steels
stainless steels
electronic and magnetic alloys
special-purpose alloy steels
valve, heat-resisting and super alloy steels
tubing and pipe
fine wire specialties

***Carpenter* steel**

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Alloy Tube Division, Union, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.
Webb Wire Division, New Brunswick, N. J.

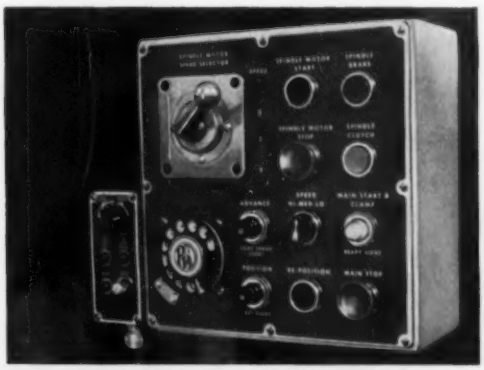

BIGGEST

Work-Size Capacity

. . . ever offered in a Precision Jig Borer!

the New PRATT & WHITNEY 4EA

with 70-inch height capacity from table to spindle end



NEW DIAL-TYPE CONTROL STATION



NEW INPUT DATA DISPLAY PANEL

This new P&W Jig Borer provides the extra capacity you need to handle large components. And – locating to *.0001"* – it has the dependable accuracy you need to meet the high standards of the aircraft, missile, nuclear energy and other industries where extreme precision is a must. Table-top-to-spindle-end maximum distance is 70", with a combined travel of head and quill of 64". As a result, the spindle can be brought within 6" of the table surface. It has the capacity to machine to the center of a workpiece 80" in diameter. Despite its greatly increased height, the 4EA Jig Borer has an accuracy of vertical alignment equal to that of all Pratt & Whitney Jig Borers. This is made possible, by an entirely new column design, with the counterbalances supported by an independent superstructure and not by the column itself.

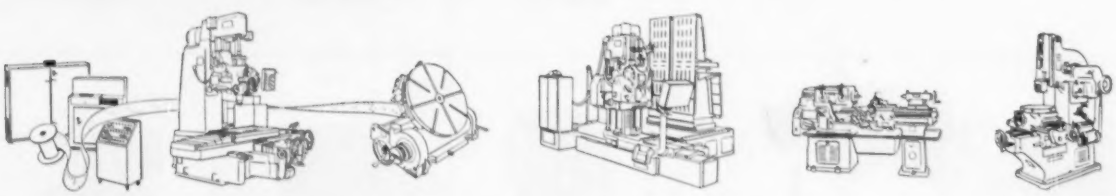
NEW DIAL-TYPE NUMERICAL CONTROL

To bring the greatest possible speed and efficiency to your high-precision jobs . . . and eliminate operator errors . . . the 4EA Jig Borer is equipped with P&W Numerical Control. This system provides for automatic positioning of the rectangular work table and, if desired, for the built-in rotary table as well.

Under P&W Numerical Control, the 4EA Jig Borer can be positioned automatically by a punched tape or – where tape control is not desired – the operator can feed positioning data into the machine using either of the 2 Control Stations. These compact stations feature a new control system that allows the operator to *dial* positioning data as quickly and easily as he dials a phone number. Since one of these stations is located at the front of the bed and the other on the spindle head, one will always be handy to the operator's hand. Operating under either tape or dial control, input data is always clearly indicated on a Display Panel located on top of the Tape Reader. This provides a continuous double-check on the correctness of positioning data.

If your jobs demand big *capacity and extreme precision combined with peak production efficiency, the new Pratt & Whitney 4EA Jig Borer has* everything *you need to handle your work faster and more accurately. Write now for more complete information on the 4EA and on other P&W Precision Jig Borers.*

PRATT & WHITNEY COMPANY, INC.
10 Charter Oak Blvd., West Hartford, Conn.



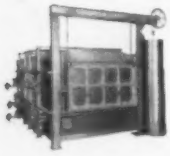
NUMERICAL CONTROL . . . JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

SURFA



large oven



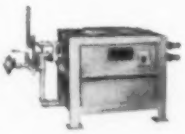
small oven



laboratory



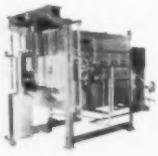
circular pot



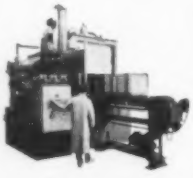
rectangular pot



forge



balco® atmosphere



allcase® atmosphere



horizontal muffle



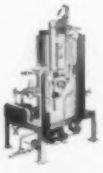
vertical muffle



brazing



sintering



MRX® atmosphere generator



MDX® atmosphere generator



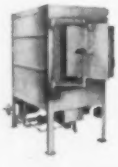
MAX® atmosphere generator



stainless steel



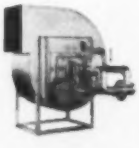
rivet heater



horizontal convection



vertical convection



direct air heaters

C E



tilting metal melting



stationary metal melting



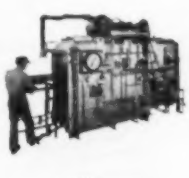
soft metal melting



aluminum melting-holding



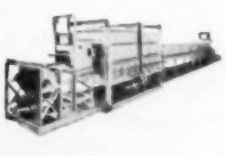
continuous snap hearth



continuous link belt



indirect air heaters



continuous brazing

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The Surface line of Standard Rated equipment offers a broad range of types and sizes to choose from. Exactly what is needed can be selected. Standard furnaces can be modified to meet the demands of unusual applications.

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Rated production makes it easy to determine the quantity of finished product which a Surface unit will produce in any given period of time.

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Tabulated figures and performance curves on all units clearly indicate in advance the operating cost per pound of finished product.

quick delivery

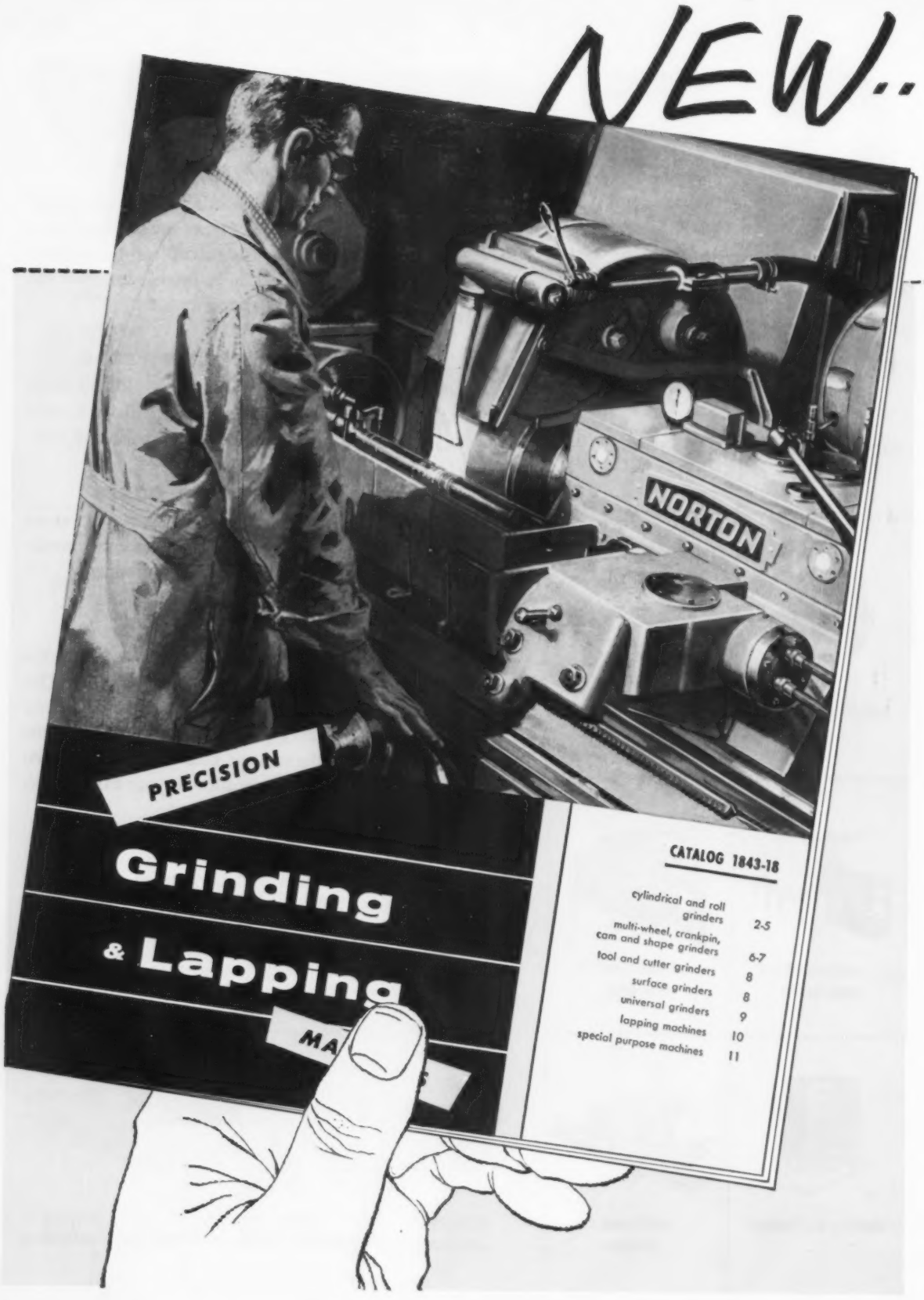
Surface standardization permits stocking the same parts for many different furnaces. This cuts engineering and procurement time. Surface also offers 80 types and 800 sizes of industrial burners—the same as used on Standard Rated furnaces—for application to your existing furnaces or other requirements.

Write for Bulletin SC-175.

Surface Combustion Corporation, 2373 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

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wherever heat is used in industry


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NORTON
PRECISION
Grinding
& Lapping
CATALOG 1843-18
cylindrical and roll grinders 2-5
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tool and cutter grinders 8
surface grinders 8
universal grinders 9
lapping machines 10
special purpose machines 11

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My operators would rather run free-cutting Brass than any other metal.

The end result is a better product, more satisfied customers.

Scrap return value on free-cutting Brass is very often a key factor in the profit picture."

Open up a new profit picture for *yourself* with the traditional quality of Bristol Brass, Bristol service and delivery. Write, wire or phone:

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BRISTOL BRASS
Corporation

SINCE 1850,
MAKERS OF BRASS STRIP,
ROD AND WIRE IN
BRISTOL, CONNECTICUT

Bristol Brass has offices and warehouses in Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, Syracuse,

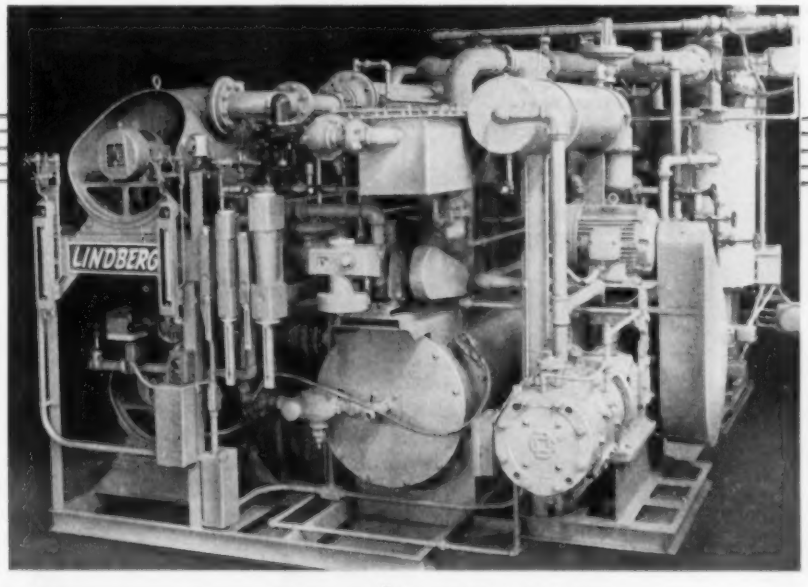
and for BRASS FORGINGS, too . . .
ACCURATE BRASS CORP.
(Subsidiary of The Bristol Brass Corp.)
Bristol, Connecticut

*Atmosphere of 99.99% inert gases now provided by new Lindberg HYNI Generator

**Completely new, fully automatic, dry process provides highest degree of nitrogen purity

***This process produces nitrogen for only $0.17 to $0.20 per 1000 cubic feet

In the metals industry this superior nitrogen atmosphere is ideal for bright hardening, free from carburization and decarburization . . . annealing and normalizing without scale, decarburization or carburization . . . bright copper and silver brazing . . . carbon correction of decarburized forgings or bar stock . . . sintering of powder metals . . . gas carburizing and carbonitriding. It is also useful as a blanketing gas in the chemical and food processing industries.



This new HYNI generator is an important addition to Lindberg's complete line of controlled atmosphere generators. Write us for complete information on this remarkable new unit, and other Lindberg generators for any required atmosphere type.

See us, too, in Booth 331 at The Metal Show

**How The Process Operates

This 99.99% pure atmosphere is produced by a completely new, dry, fully automatic process. It uses the principle of burning a hydrocarbon fuel in a separate catalytic combustion chamber to obtain complete reaction without unburned methane, high residual oxygen or a high percentage of oxides of nitrogen. Carbon dioxide, water vapor, sulphur dioxide or hydrogen sulphide are simultaneously removed in a dry, absorbent material known as Molecular Sieve made by Linde Division of Union Carbide and Chemical Corporation.

*Sample of Analysis Obtainable With HYNI Generator

Oxygen	0.00%
Carbon dioxide	0.01%
Hydrocarbons	0.00%
Water vapor: Less than -80° F. dewpoint (7 p.p.m. when measured by a Beckman Hygrometer)	
Hydrogen	0.00%
Carbon monoxide	0.00%
Sulphur	0.00%
Oxides of nitrogen	0.00%
Nitrogen and Argon (trace)	99.99%

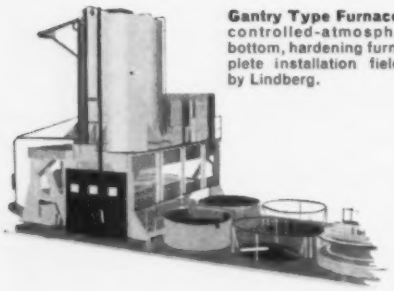
***This Process is Economical

One of the advantages of this process of producing nitrogen is its low cost. With the HYNI Generator the nearly-pure nitrogen is produced for only $0.17 to $0.20 per 1000 cubic feet. Cost of power, raw gas and cooling water is included and based on: fuel gas at $0.60 per 1,000,000 BTU; electricity at $0.01 per KWH; cooling water at $0.05 per 1000 gal. Quoted cost does not include maintenance or amortization. Lindberg quality design and construction assures complete dependability and lowest maintenance cost.

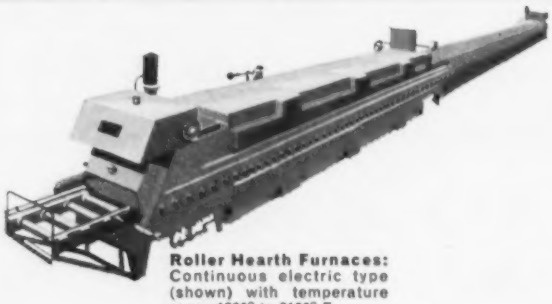
LINDBERG
GAS PROCESSING DIVISION
ENGINEERING COMPANY 2452 West Hubbard Street, Chicago 12, Illinois

Wherever industry needs heat...

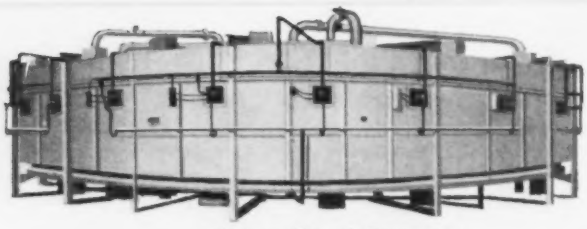
You'll find *LINDBERG* equipment just right for the specific job



Gantry Type Furnace: Vertical, controlled-atmosphere, drop bottom, hardening furnace. Complete installation field-installed by Lindberg.



Roller Hearth Furnaces: Continuous electric type (shown) with temperature range 1300° to 2100° F.



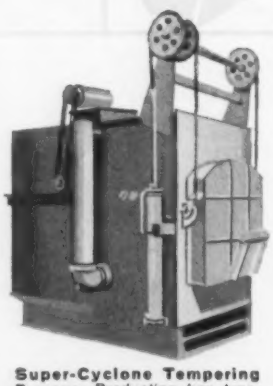
Rotary Hearth Furnaces: Doughnut type field-installed gas-fired furnace (shown) with capacity of 13,000 lbs. per hour.



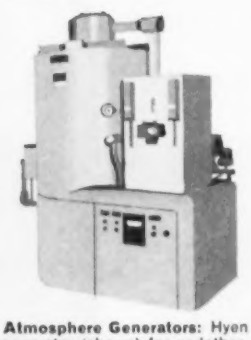
HF Induction Heating Units: Available in 5, 10, 25 and 50 KW units.



Vertical Type Furnaces: Carburizing and hardening furnace (shown) with CORRTHERM electrical heating elements.



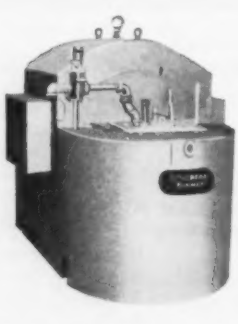
Super-Cyclone Tempering Furnace: Production box type. Electric or gas. Two temperature ranges—to 1750° F.



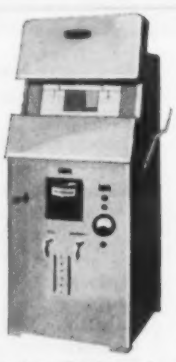
Atmosphere Generators: Hyen generator (shown) for endothermic atmospheres. Generators for all required atmospheres.



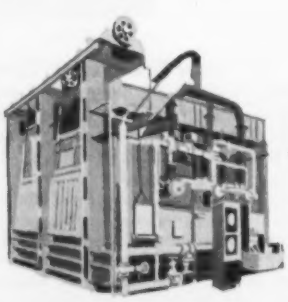
Ceramic Kilns: Gas-fired periodic kiln (shown) with temperature range to 3250° F.



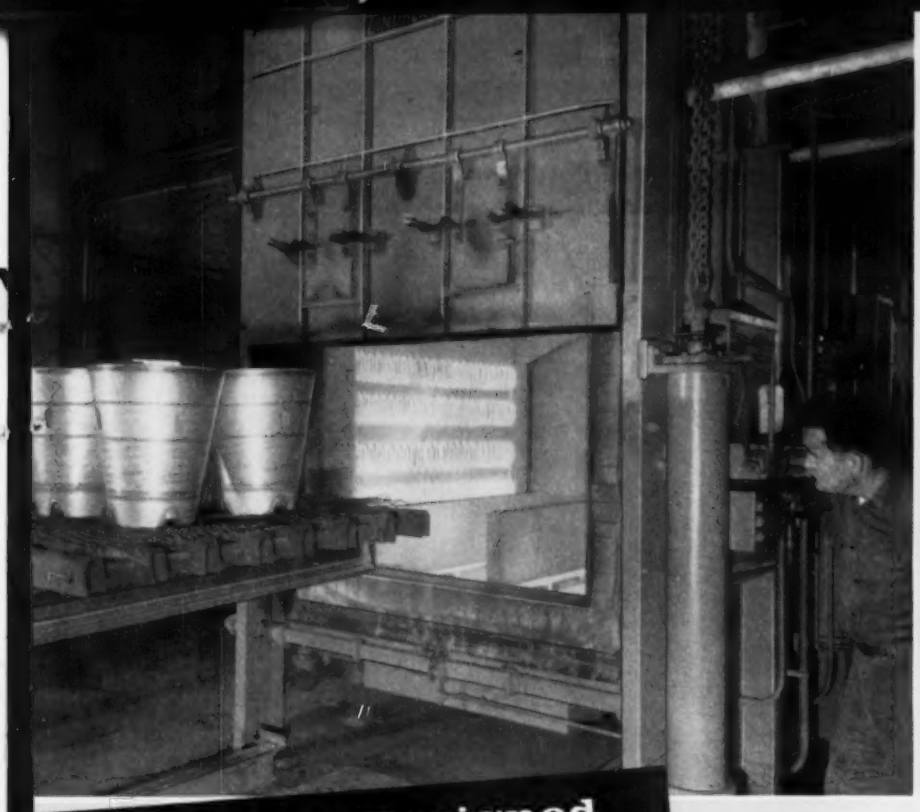
Melting and Holding Furnaces: Electric resistance furnace (shown) with capacities of 750 lbs. to 1500 lbs.



Laboratory Equipment: One-unit box furnace (shown), muffle or for non-oxidizing atmosphere with temperature range to 3000° F.



Aluminum Reverberatory Furnaces: Twin-chamber melting and holding furnace (shown) with 45,000 lbs. capacity.



Lindberg-Designed

heat treating installation reduces jet engine parts pickling costs 25% for Jervis

This specially designed annealing and heat treating furnace at Jervis Corporation, Grandville, Michigan, is an interesting example of how cooperation between the user and the maker of heat treating equipment can adopt established furnace principles to the improvement of production methods. Jervis and Lindberg engineers, starting with a conventional box type furnace, designed this furnace with two chambers, one for preheat and one for high heat, and added a third with a water jacket for protective cooling. This combination provides efficient heat equalization, protective atmosphere, and protects against corrosion and carbide precipitation. Jervis estimates this furnace provides a 25% reduction in pickling costs, as well as improved quality, in the treating of jet engine parts.

Lindberg equipment and Lindberg planning can help you find the most effective answer to any problem of applying heat to industry. We cover the field, heat treating, melting and holding, tempering, brazing, enameling furnaces, ceramic kilns, high frequency units, and are in the ideal position to recommend just the type of equipment most suitable for your needs. This can be factory built or field-installed in your own plant, fuel-fired or electric. Consult your local Lindberg Field Representative (see the classified phone book) or get in touch with us direct. Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.



The handsome Jervis plant at Grandville, Michigan occupies 238,300 square feet of floor space.



Mr. James Bockheim, Metallurgist at Jervis, says, "We can handle any aircraft material in this furnace . . . and operate it with just one man."

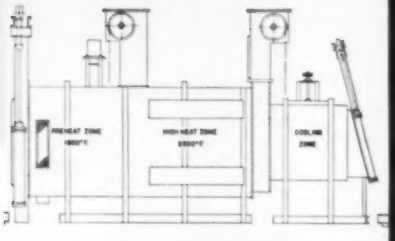
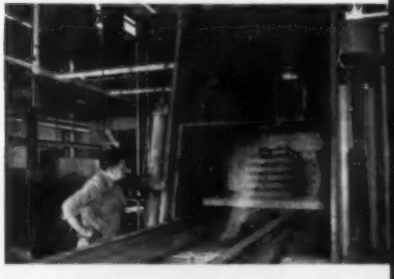


Diagram shows the unusual three-chamber furnace design.



Work coming from the cooling chamber after treatment.



Lindberg generator produces furnace atmosphere exothermically from natural gas.

★ Look up Lindberg Booth 331 at the Metal Show

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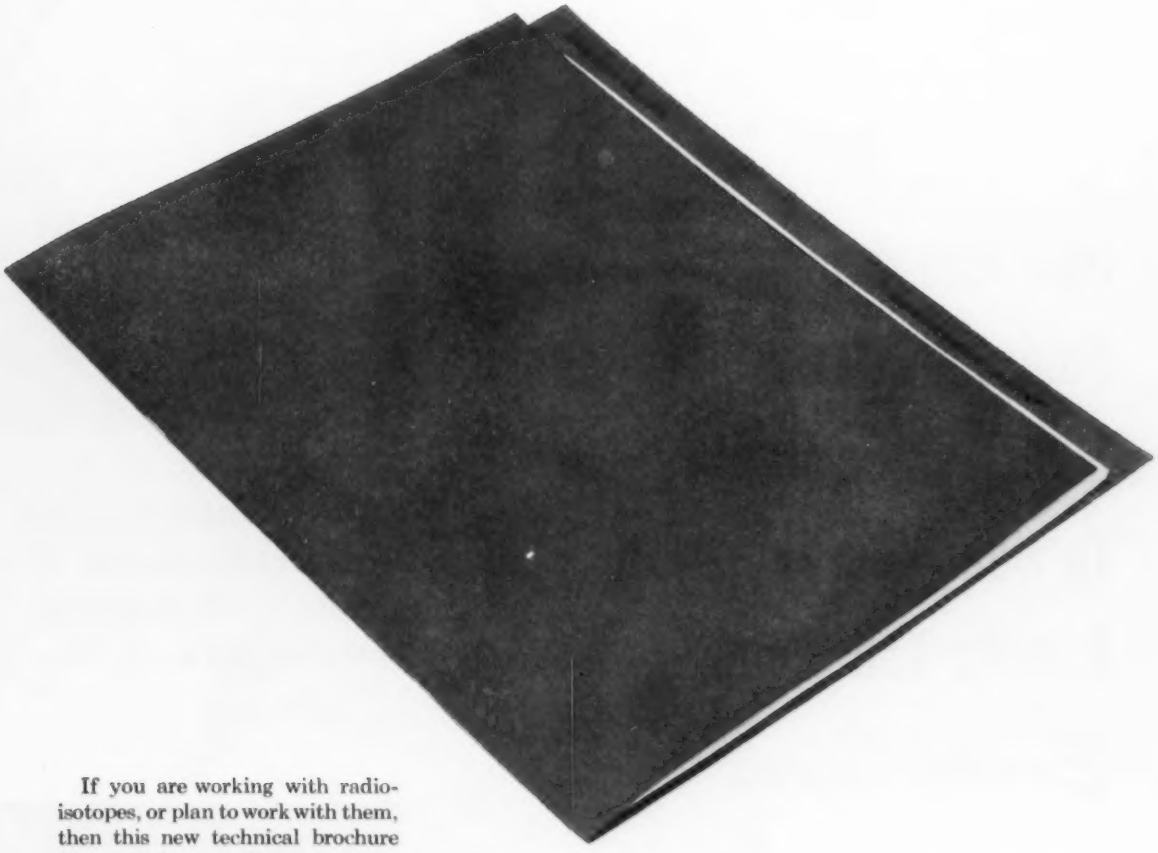
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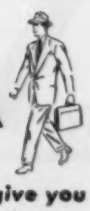
HOUGHTO-QUENCH CONCENTRATE . . . to speed up the quenching rate of oil. Added to straight mineral oil baths, Houghto-Quench Concentrate improves stability and heat-removing ability.

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*Based on comparative initial costs depreciated over 10,000 working hours.

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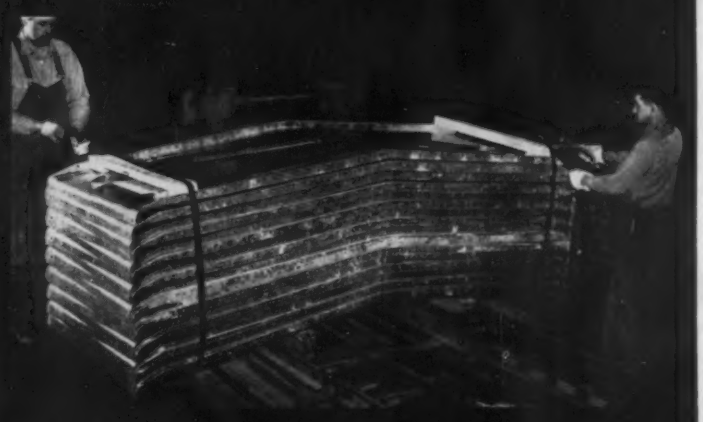
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ACME STEEL **STEEL STRAPPING** braces loads of wire fencing for safe, secure shipment in gondola cars. *(Idea No. U3-1)*



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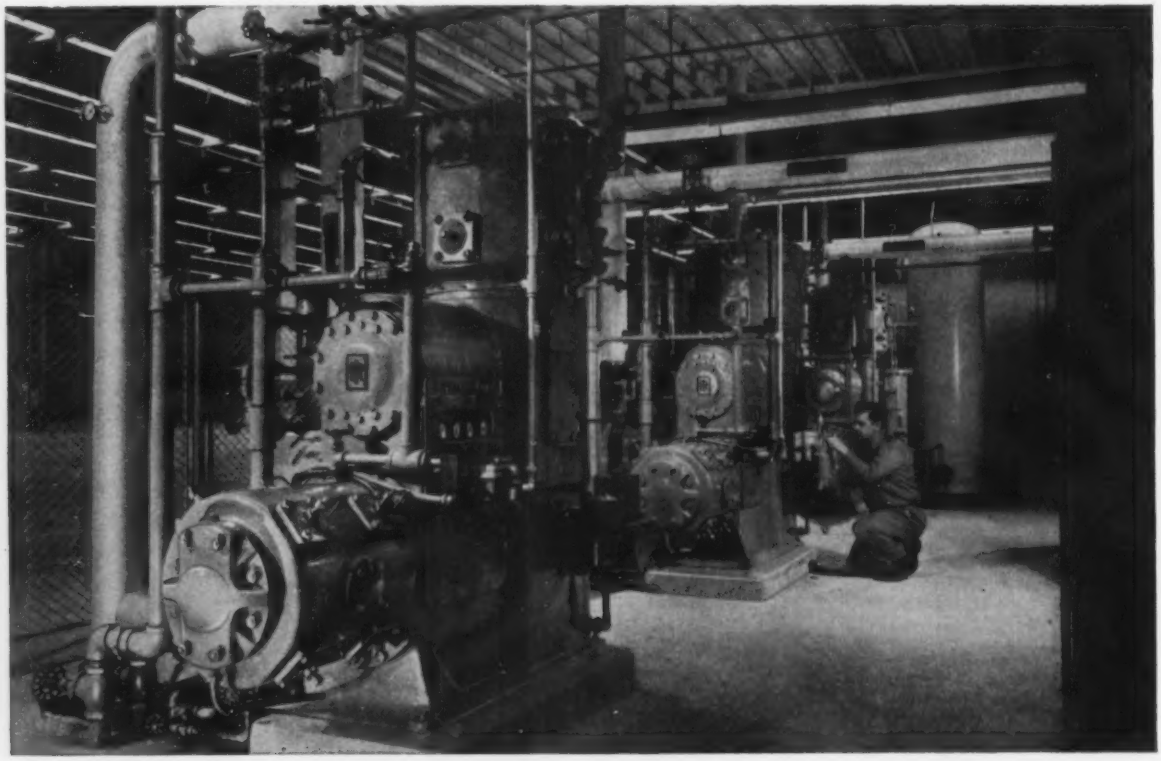
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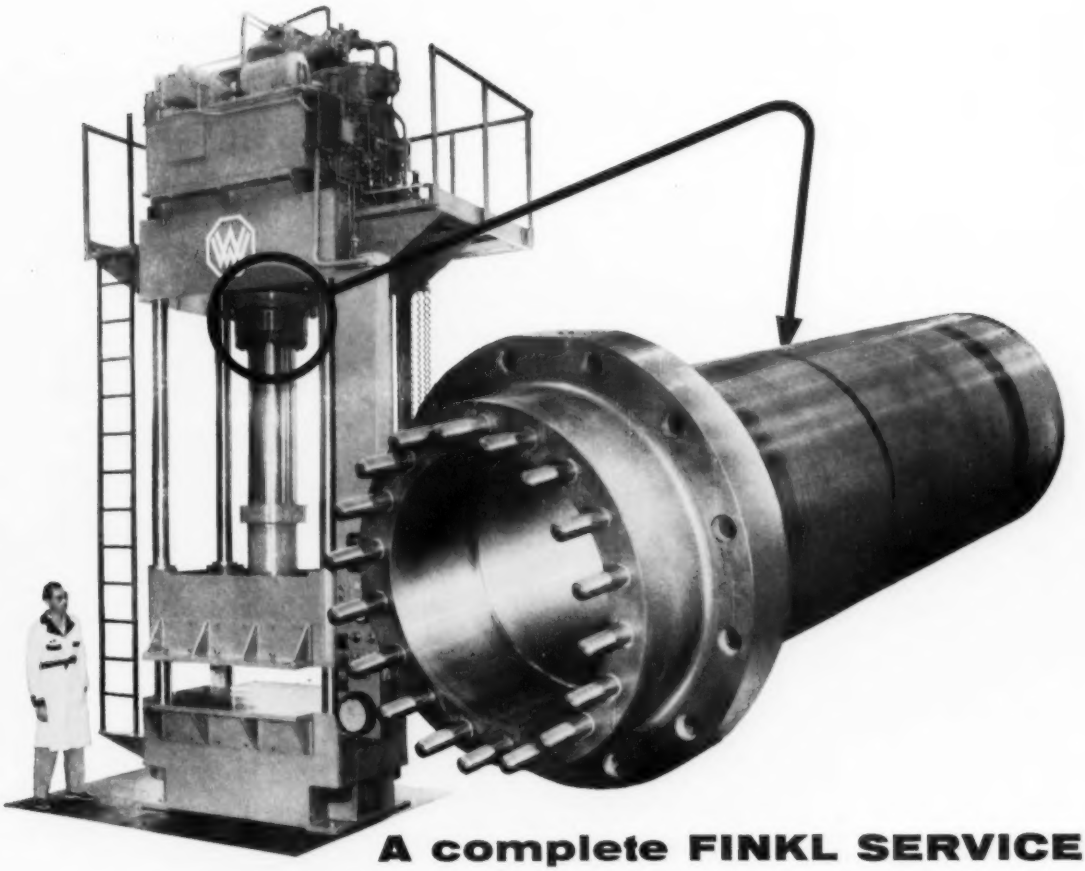


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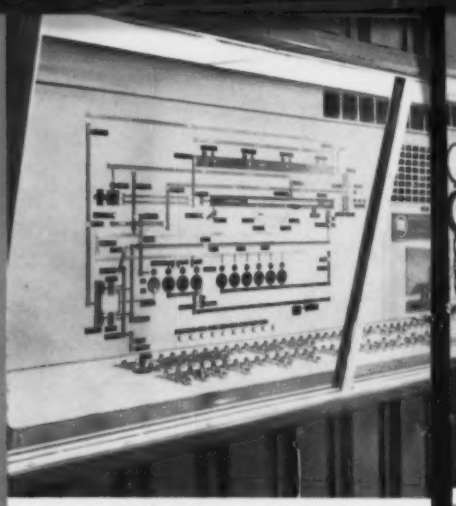
Historical dates in Continuous Sintering

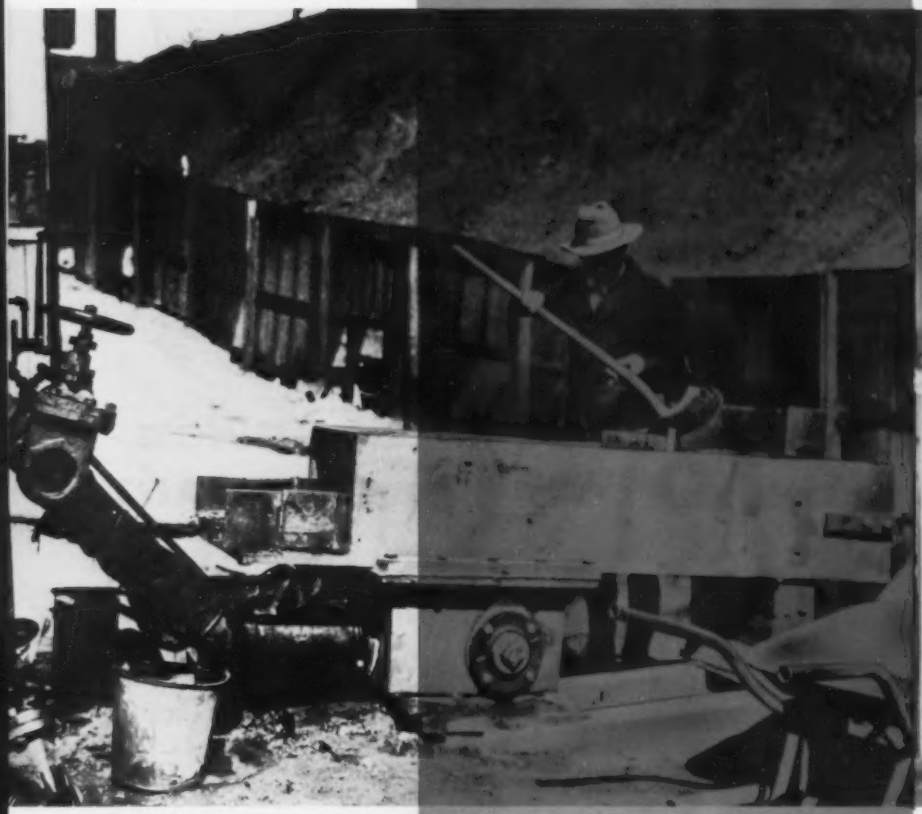
1906 The continuous sintering process was invented by Arthur S. Dwight and Richard L. Lloyd following extensive experiments at the Greene Consolidated Smelter in Cananea, Mexico. Patent was applied for.

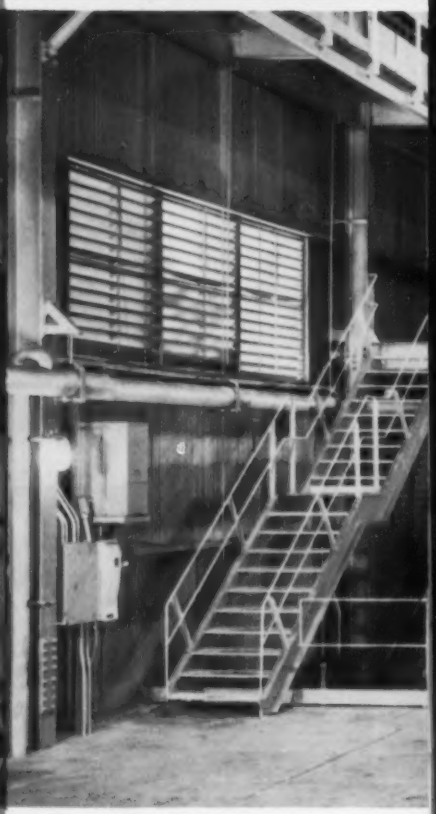
1908 The first patents on the process were granted.

1908 Dwight and Lloyd applied for a patent on the product — a cake of sinter — which was granted.

1908 The first commercially successful continuous sintering plant was installed at Salida, Colorado at a multi-metals smelter. It marked the establishment of the "straight line" or classic machine, the design that endures to this day.







Richard Lloyd shown charging the Dwight-Lloyd invention machine on the day the continuous sintering process was born. An original photo, preserved in the Dwight-Lloyd historical archives.

1908 Dwight began his first investigations of a sintered beneficiated blast furnace charge for ferrous industries.

1909 Dwight and Lloyd granted a license to Lurgi-Gesellschaft to build sintering equipment under the Dwight-Lloyd patents.

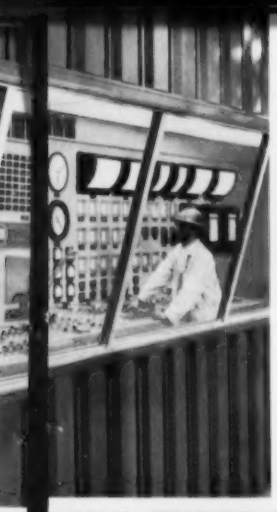
1911 The first ferrous sintering plant was installed at Birdsboro, Pennsylvania. The plant was designed by Dwight and Lloyd and delivered by a licensee, American Ore Reclamation Company.

1920 The Dwight-Lloyd Research Laboratories were established to fully investigate minerals processes.

1955 McDowell Company, Inc. acquired the business and assets of Dwight and Lloyd, including the Laboratories, and moved them to Cleveland, greatly expanded.

Now

50 YEARS
DWIGHT·LLOYD®
CONTINUOUS SINTERING





Left, automated control center for new 5,000 ton per day single strand ferrous Dwight-Lloyd* sintering plant. Above, general view of plant. Right, the McDowell-developed Flying Saucer*, unsurpassed as a sinter mixing and pelletizing disc.





Flying Saucers charging proportioned feed to Dwight-Lloyd machine at Ohio Works, U. S. Steel Corp.

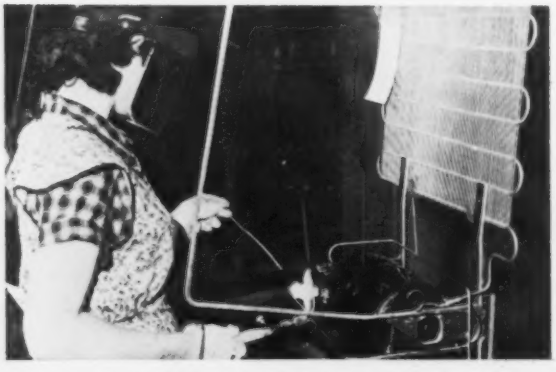
DWIGHT-LLOYD SHOWS SINTERING'S GOLDEN ERA

Big production ferrous installations are the newest Dwight-Lloyd sintering plants, developed to increase capacities of high-investment blast furnaces through beneficiation of raw materials. This acknowledges the work of our illustrious ancestors, the American metallurgists Dwight and Lloyd, who invented and pioneered continuous sintering, and proved to Illinois Steel Co. in 1908 the economical merit of sinter as blast furnace feed.

Culminating fifty years' practice, today's rugged Dwight-Lloyd plants reflect advanced McDowell engineering *and U.S. tonnage experience* in 1) proportioning and blending, 2) ignition, 3) burning and 4) cooling — all pilot-plant-proved in our famous Dwight-Lloyd Research Laboratories, established by the inventors in 1920, busy ever since on behalf of an international clientele engaged in all phases of minerals processing. Exclusive: Wellman hell-for-stout fabrication.

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Big names in refrigeration get big benefits from Handy & Harman Sil-Fos and Easy-Flo!



HOTPOINT COMPANY, CHICAGO, for example, uses EASY-FLO 45 in tube joints connecting the major components of many models of HOTPOINT Refrigerators. Metals joined are copper-to-copper, copper-to-steel, and steel-to-steel. Each joint must meet a tensile strength test of 30,000 psi. Joint strength? Variety of metals to be joined? Take a tip from HOTPOINT . . . use EASY-FLO 45.

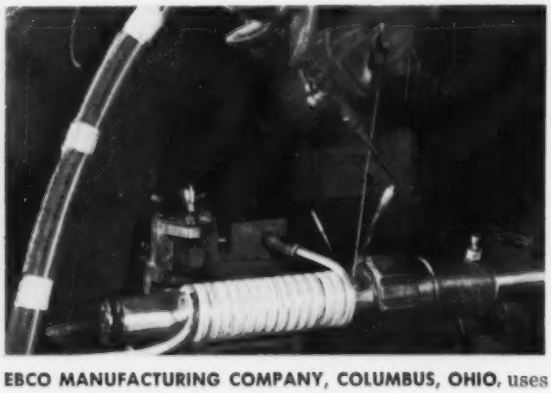


KRAMER-TRENTON COMPANY, TRENTON, N. J., uses SIL-FOS 5 in different models of condensers for a variety of industrial and domestic air conditioners and refrigeration systems. Shown here is their model ED 3200. Each of its 80 joints is SIL-FOS 5 brazed for lifetime leak-tightness. For a smooth-flowing brazing alloy and high economy per joint, SIL-FOS 5 is the "all-around" answer.



TECUMSEH PRODUCTS COMPANY, TECUMSEH, MICHIGAN, makes broad use of EASY-FLO 45 in a number of components for air conditioners, refrigerators and freezers.

For instance, a four-part muffler header sub-assembly used in compressors and consisting of shaped tubing and cast iron is EASY-FLO brazed by preplacing rings of the alloy at the joints and placing the unit in a unique jig for rotary heating. Production rate is 350 assemblies per hour. Speed? Adaptability of jigging? Look to silver alloy brazing . . . spelled E-A-S-Y-F-L-O 45.



EBCO MANUFACTURING COMPANY, COLUMBUS, OHIO, uses *both* SIL-FOS and EASY-FLO 45 in its "Oasis Hot 'N' Cold" water cooler. Five components of this unit are brazed with one or the other of these stalwarts of the refrigeration industry, using both hand torch and induction heating.

Take your pick of silver alloy brazing advantages and apply them to your product and production needs. What you don't see here, ask us about. We invite inquiries on EASY-FLO and SIL-FOS and what they can do for you.

START WITH BULLETIN 20

This informative booklet gives a good picture of silver brazing and its benefits...includes details on alloys, heating methods, joint design and production techniques. Write for your copy.



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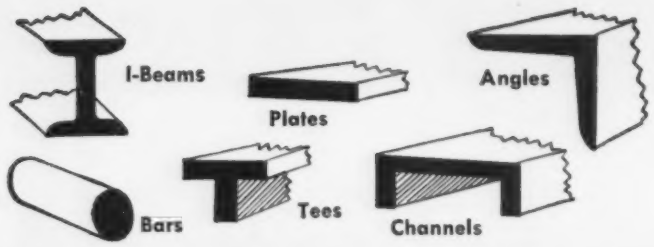
WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

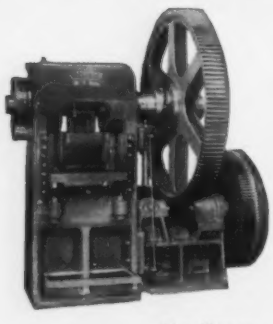
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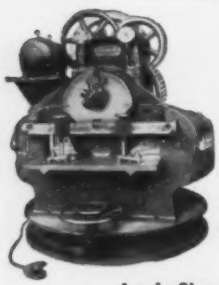


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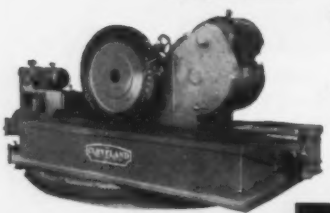
CLEVELAND
FABRICATING TOOLS



Bar Shears



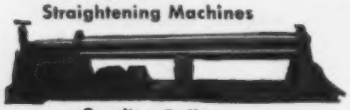
Angle Shears



Rotary Planers



Bending and Straightening Machines



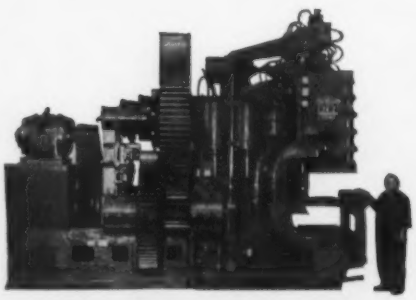
Bending Rolls

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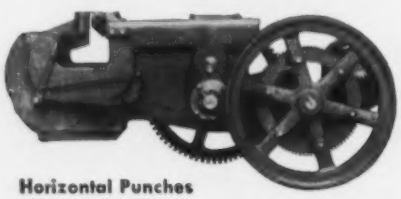
Leading shipyards, railroads, bridge builders, boiler makers, and other structural steel and heavy plate fabricators have proven the dependable, economical performance of Cleveland Fabricating Tools.

Since 1880, Cleveland has engineered its complete line of fabricating tools to be the finest, most efficient for punching, shearing, bending, rolling, straightening, planing, coping and notching I-beams, tees, zees, channels, bars, rods and other structural shapes.

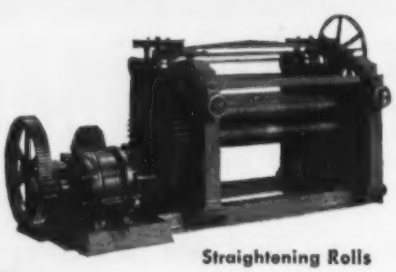
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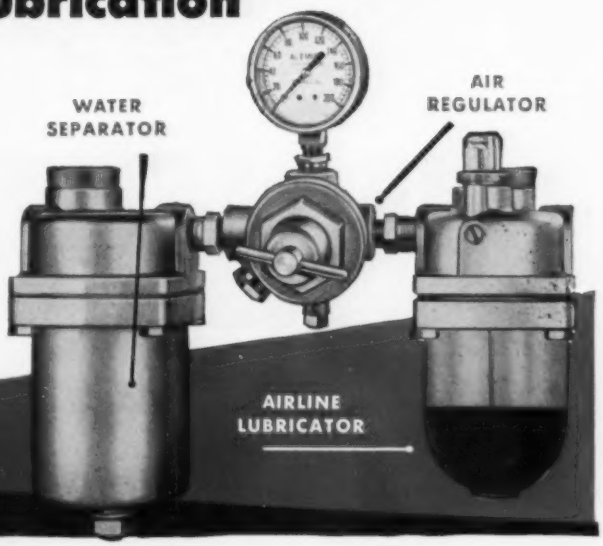
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All-New...for the cleanest, driest, best-regulated air line lubrication

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10. Concentric Venturi Design. Assures constant, uniform mixture of air and oil.

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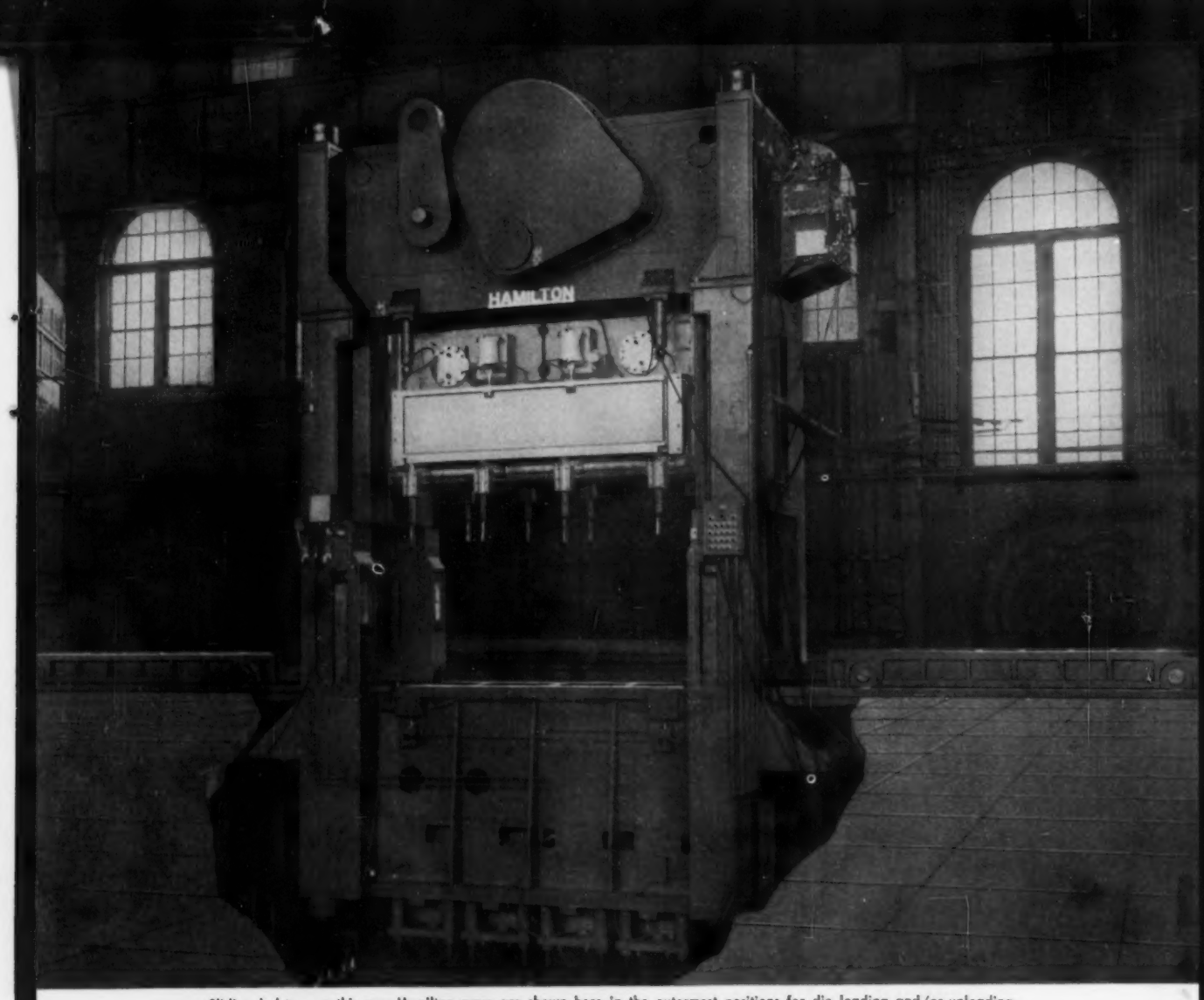
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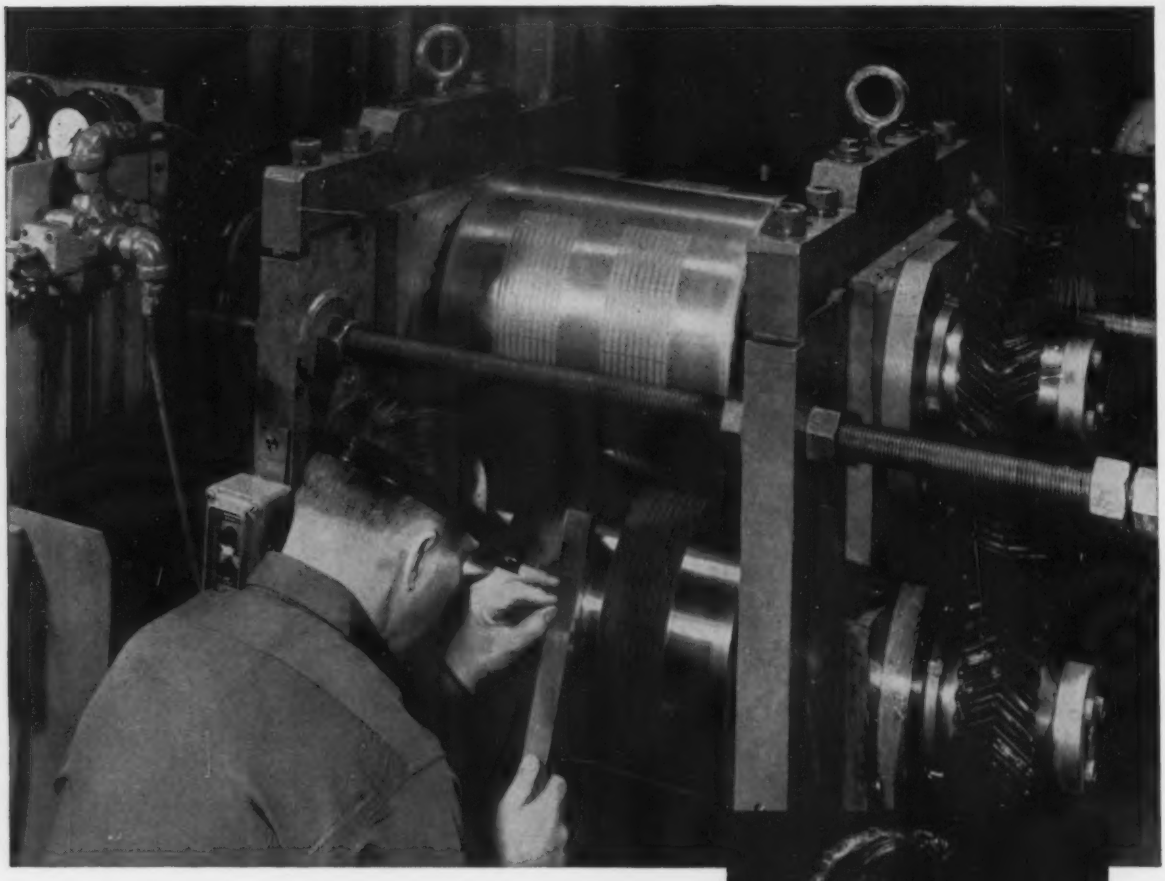
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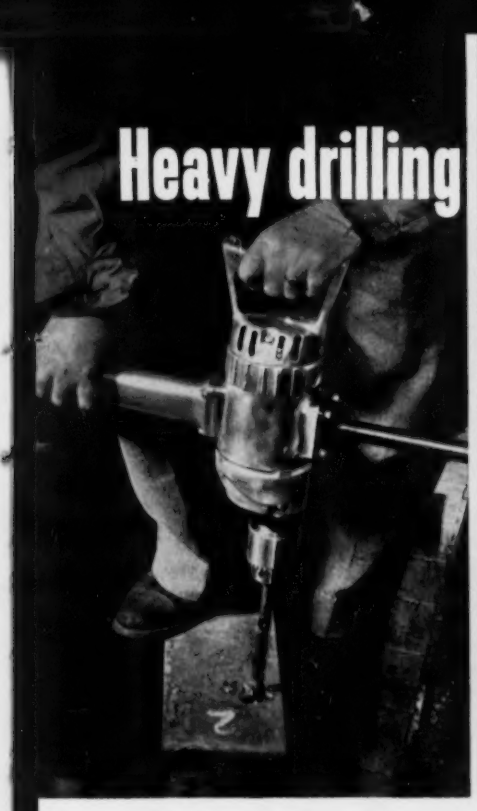
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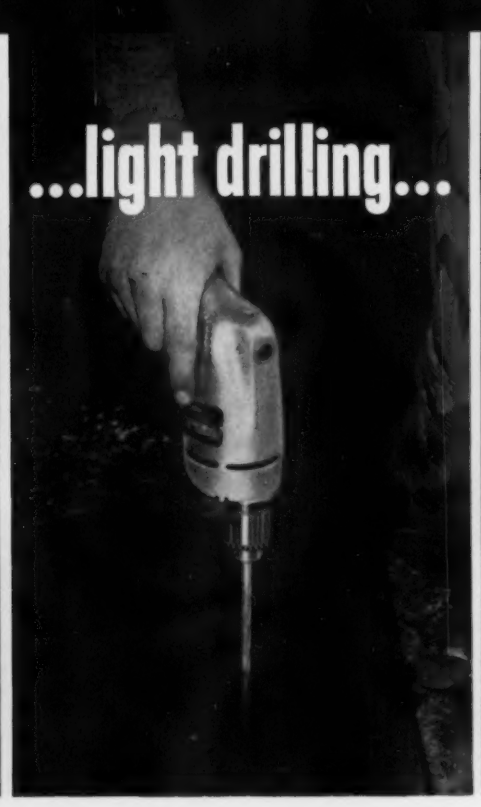
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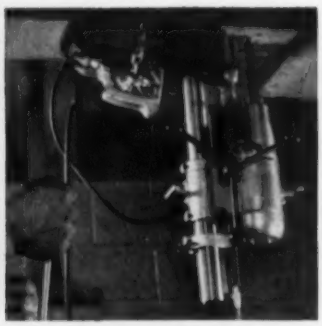




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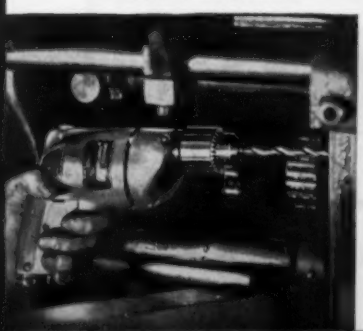
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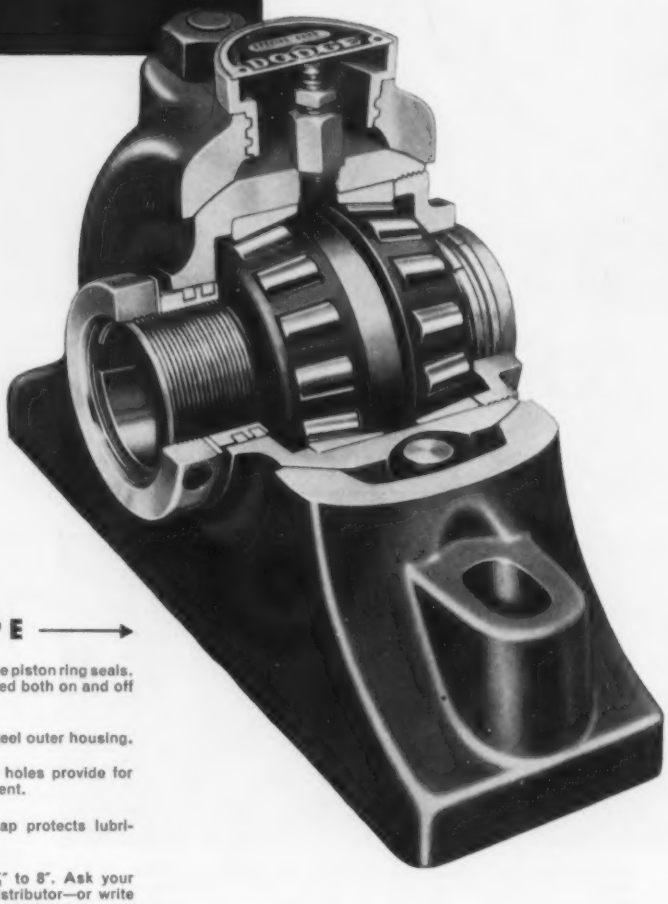
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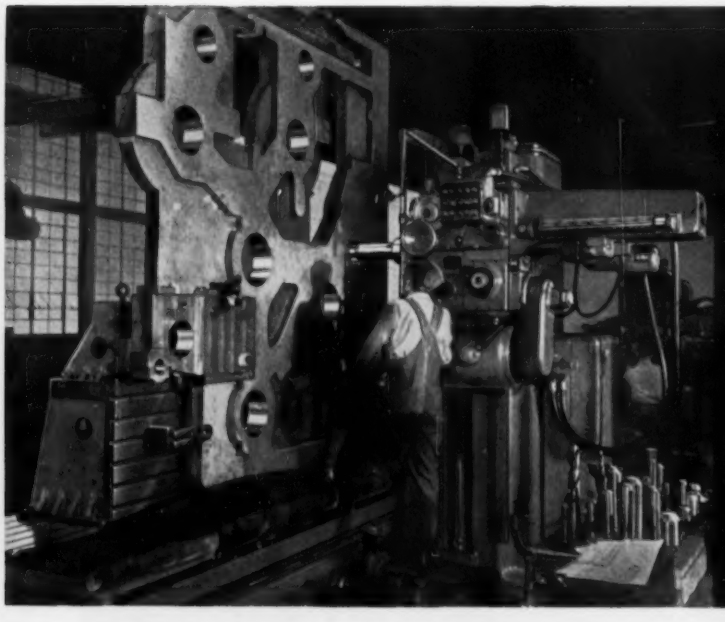


"I accepted an invitation to go to Fair Street and there saw the JIGMIL Technique in operation doing jigless boring to degrees of economy and precision that verified what I had heard in the lecture. The gains that were apparent from the analysis made for us by the DeVlieg engineers caused us to purchase a number of JIGMILS. These machines have been in use for several years. We have experienced many advantages. The principal ones are improved quality and a considerable reduction in machining, inspection and assembly times. The quality of the work resulting from the outstanding JIGMIL accuracy has had a far-reaching improving effect on the general quality and performance of our product."

A. O. HOLMBERG

WILL YOU BE THE NEXT TO VISIT FAIR STREET DE VLIEG MACHINE COMPANY

to Fair Street



A FEW PROVEN ADVANTAGES OF THE JIGMIL TECHNIQUE—

- Eliminates cost of expensive jigs and production delays resulting from their manufacture.
- Simplifies tooling.
- Employs automatic functions to reduce factors of human error even in close tolerance work.
- Makes possible greater flexibility of product design.
- Improves end product by permitting interchangeable assembly of parts without hand fitting.
- Increases production and product accuracy.

ACCURACY IS AN ECONOMY!

A TYPICAL EXAMPLE OF JIGMIL ACCURACY

Goss uses the JIGMIL Technique for boring components of their famous high-speed newspaper, magazine and color printing presses. Illustrated above is one of the side frames for an 80 ft. multi-color press recently built by Goss. This part was bored on a Model 4B-120 SPIRAMATIC JIGMIL. JIGMILS were used for boring approximately 2260 holes in the side frames and gear boxes for this press. In the assembled press, the accuracy of hole size and spacing made it possible to hold the register of 5 colors within .001".

Our newest catalog will help you decide. May we send it?

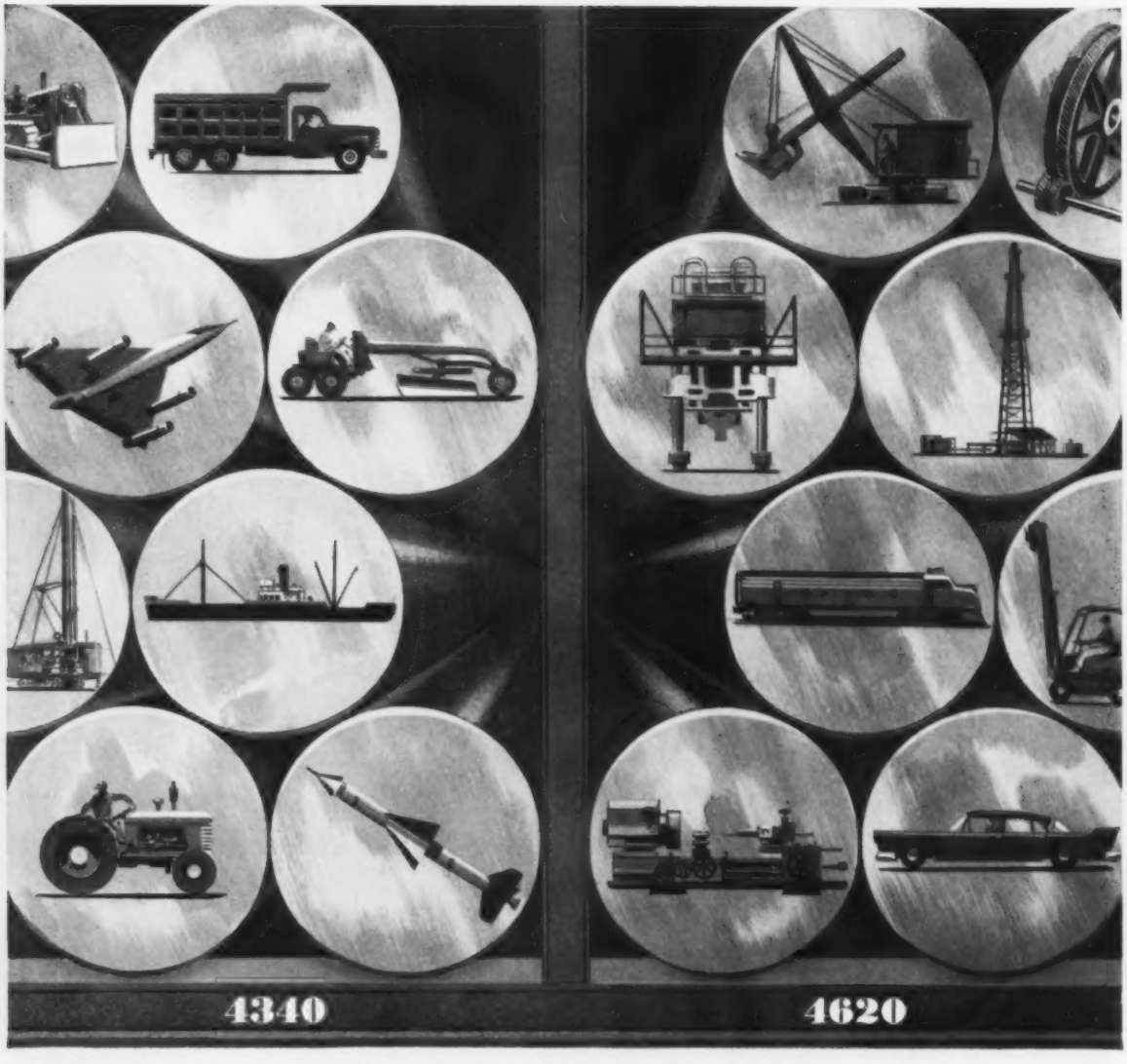


DeVlieg

SPIRAMATIC JIGMILS®

ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

FAIR STREET, ROYAL OAK, MICHIGAN



No matter what you make...

look to these two general purpose steels to standardize, simplify, and save money!

4340 THROUGH-HARDENING

4340 stands alone among medium carbon steels in its ability to provide maximum strength, ductility, toughness and resistance to fatigue in parts of medium to heavy cross section.

4620 CARBURIZING

4620 is a carburizing type that has consistently proved itself the ideal steel for a wide variety of carburized parts. 4620 is easy to carburize and has a minimum tendency toward distortion in heat treatment.

AMERICAN STEEL WAREHOUSE ASS'N.

Easy to Get *... Both these steels are carried by many Steel Service Centers from coast to coast* ... ready for delivery on a "next door" basis. For a list of names and addresses of Steel Service Centers that carry AISI 4340 and 4620, write us.

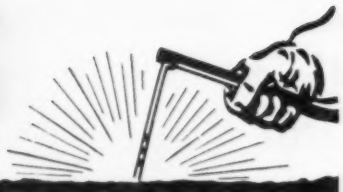
THE INTERNATIONAL NICKEL COMPANY, INC.

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INCO

See you at the Metal Show... Booth 445

Weldynamics



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New Shielded Arc Automatic Welding

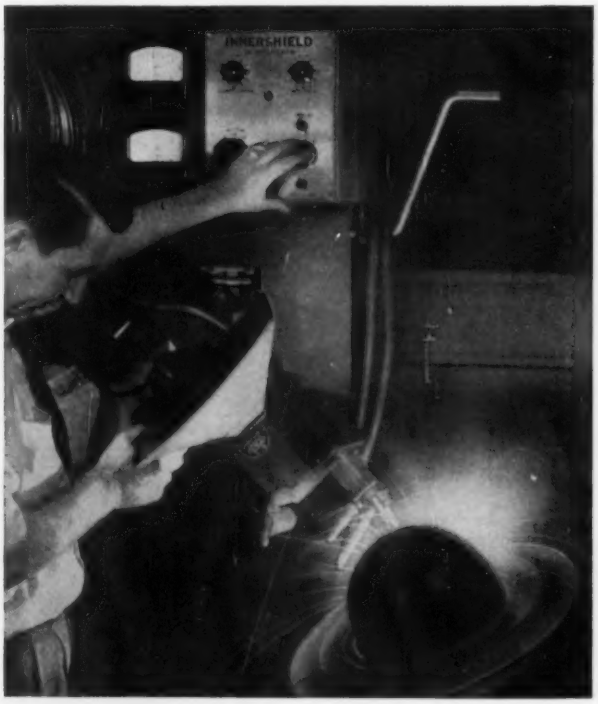
Speeds to 180 ipm!

on 14 gage steel

No Flux or Gas

with

INNERSHIELD



Innershield—an ultra-high speed automatic welding process. No loose flux or gas! Shielding material is in the wire. Produces welds of shielded arc quality consistently at speeds as high as 180 inches per minute. For steels ranging from light gage to ¼" thick.

If you do high speed, production welding, learn how Innershield will speed up your operation and cut costs. Write for Bulletin 5301.1.

The World's Largest Manufacturer of Arc Welding Equipment



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THE LINCOLN ELECTRIC COMPANY • DEPT. 1547 • CLEVELAND 17, OHIO

Take a Critical Look

at the design of your Gear Shaving Machines

In today's competitive economy, it is imperative to scrutinize each production machine from the standpoint of operating costs. Just what does it contribute? What does it cost to operate? How does its design affect its operating economy? These questions suggest other more specific questions in the case of gear shaving machines:

CHIPS

- Are the cutters of your machines so located that chips fall away from them rather than into them?

LOADING HAZARD

- If, while loading, a work gear accidentally slips from the operator's fingers will it fall into the cutter teeth?

GRAVITY

- Is cutting pressure applied downward, taking advantage of gravity or upward, unpredictably taking up the operating clearance of the table ways?

AUTOMATION

- Are the extra components needed to automate the machine, in the way when the cutter is changed?

RIGIDITY

- Does the single solid cast column provide more rigidity than one made up of bolted sections?
- Is a deep massive table assembly held in position by gravity more rigid than a shallower, lighter assembly hung from above?

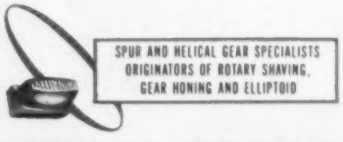
OBSTACLES

- Are there any projections above table level to interfere with the operator's movements as he loads a work piece or changes the cutter?

FEED

- Is the automatic feed mechanically positive and consistently precise?

To check your answers to these pertinent questions, call your Red Ring representative and suggest he bring along Bulletins AP 57-11 and S-57-2—All in the interest of ECONOMY.

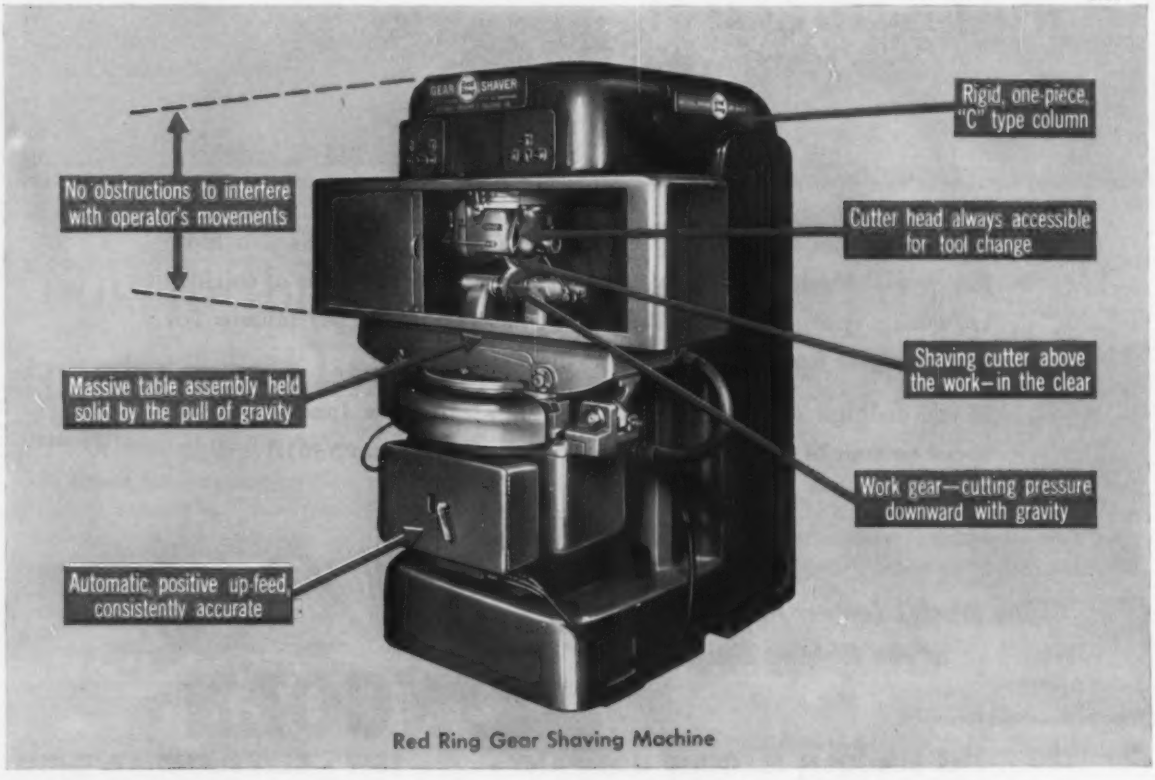


NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

BT59



Red Ring Gear Shaving Machine

One good turn deserves 192 others!





Pipe fabricators: Cornell & Underhill, Inc., Hoboken, N. J.

During fabrication, the USS* NATIONAL Seamless Steel Tubes used in this 8-ton heat exchanger were turned, or bent, 193 times! What's more, fabrication involved 584 pipe welds of various types and 1,720 inches of fillet welding. Mainly, the 35-foot-long, 5-foot-high bundle consists of ¾-inch Schedule 80 NATIONAL* Seamless Pressure Tubes; fabricated for the Solvay Process Division of Allied Chemical & Dye Corporation.

NATIONAL Seamless Pipe and Tubes are known the world over for safety and dependability. They are available in carbon through the various alloy and stainless grades. Get the complete story by sending for Bulletins 10 and 26. And, for technical assistance, our Mill Service Force is available for field consultation. Write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

"The world's largest and most experienced manufacturer of tubular products—NATIONAL TUBE"

National Tube Division of USS United States Steel

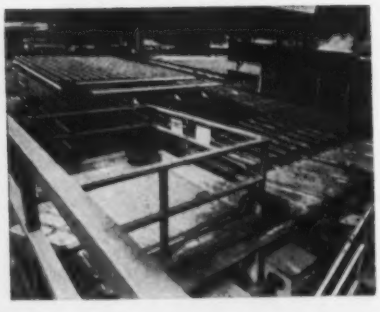
*TRADEMARK

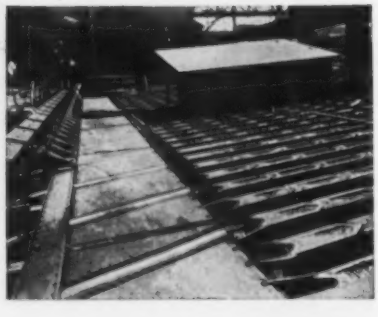
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors · United States Steel Supply Division
United States Steel Export Company, New York

Treadwell



Courtesy Jones & Laughlin Steel Corp.

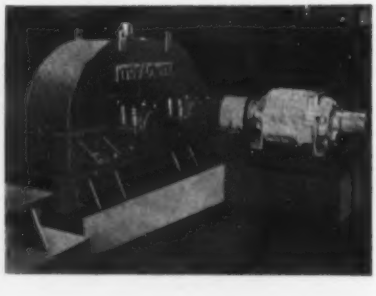




Bar and billet mill cooling beds capable of handling up to and including 5" square bars or billets up to and including 35' in length.

Beds are approximately 120' in length overall.

Bars or billets can be deposited on the beds alternately as fast as they are delivered from the mill.



Treadwell Engineering Company

EASTON, PA.

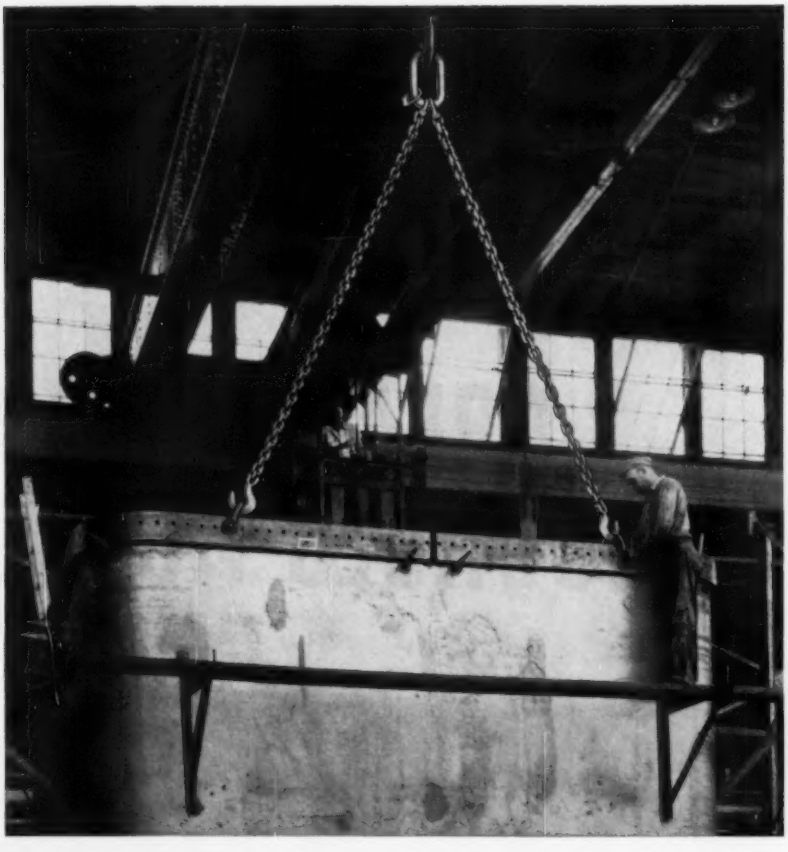
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NOW... Get One-Day Service from our Authorized Distributor on



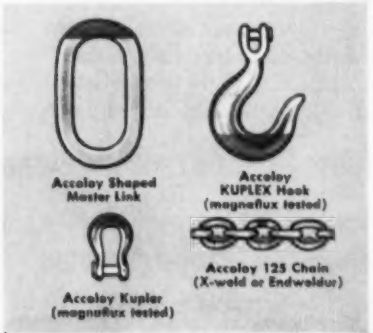
NEW ACCOLOY KUPLEX SLING CHAINS

• Imagine... you can now get ***one-day delivery service*** on ACCOLOY KUPLEX Chain Slings like you see here from our nearby Authorized KUPLEX distributor! This really remarkable development in speedy sling service is made possible by the new KUPLEX coast-to-coast system of localized service to meet your sling chain needs. No more waiting around for shipments from the factory . . . no more returning damaged slings to the factory for repairs. Our KUPLEX distributor is equipped to offer you both of these valuable services, and he's as near to you as your telephone.

KUPLEX is a modern sling chain that has been tried and proved through thousands of applications. Its streamlined form greatly reduces the chance of snagging on other objects. KUPLEX Sling Chains are assembled from genuine ACCOLOY KUPLEX component parts which have been factory proof-tested at twice their specified load limits. Each part is designed and manufactured specifically for use with all other parts of the complete KUPLEX sling assembly. These matched components are made to ACCO *Registered* Specifications from heat treated ACCOLOY steel, and are engineered to be as strong as the chain itself. Hooks and Kuplers are magnaflux-tested. In addition, you are assured of complete safety—with genuine component parts—by a **CERTIFICATE OF TEST** issued by ACCO and signed by the distributor with each complete sling purchase.

• • •

Write our York, Pa., office for the name of the Authorized Kuplex Sling Distributor nearest to you.



SIX CHAIN SIZES WITH THESE FOUR COMPONENTS

• A nearby Authorized ACCOLOY KUPLEX Sling Distributor can furnish promptly from his stock the exact sling chains you need for your specific requirements; made up from the components shown above. Six chain sizes (¼" through ⅝") are available in single, 2-leg, 3-leg or 4-leg styles.

American Chain Division
AMERICAN CHAIN & CABLE
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

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ACCO

TRADE MARK

GREAT LAKES STEEL ANNOUNCES ITS NEW GLX-W STEELS...

The Great Lakes Family of High-Strength Steels

N·A·X FINEGRAIN STEEL

Lets you design superior performance, longer life and less weight into your product. Many diversified applications.

N·A·X HIGH-TENSILE STEEL

Offers all the characteristic features of N-A-X Finegrain, plus greatly enhanced resistance to atmospheric corrosion.

GLX W

A series of fine grained, mild carbon steels. They have unusually high strength, toughness and weldability.

N·A·X N-A-XTRA STEELS

Quenched and tempered steels of excellent weldability and toughness, with yield strengths from 75,000 - 110,000 psi.

N·A·X HIGH MANGANESE STEELS

N-A-X High Manganese and High Manganese Special Killed. These steels give yield strengths up to 50,000 psi.



A series of fine grained mild carbon steels of unusually high strength, toughness and weldability

Metallurgical research has produced the new GLX-W Series of High-Strength steels. An exceptionally fine grain structure in this series makes possible the high strength, good notch toughness and excellent weldability of these steels. The series consists of GLX-45-W, GLX-50-W, GLX-55-W and GLX-60-W, based on minimum yield strengths of 45,000 psi up to 60,000 psi.

IMPORTANT MECHANICAL PROPERTIES OF GLX-W STEELS

STRENGTH—up to 60,000 psi yield strength with good ductility.

NOTCH TOUGHNESS—good notch toughness at normal and subnormal temperatures.

WELDABILITY—low carbon and manganese content assures freedom from underbead cracking under all conditions.

The combination of these properties, together with lowered material and manufacturing costs and simplified fabrication processes, indicates a wide range of applications for GLX-W steels.

For additional technical information about GLX-W steels, write

Product Development Division, Dept. A-8

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan

GLX-W

another new product developed by a division of

NATIONAL STEEL CORPORATION



VICTOR CUTTING TORCHES AND TIPS

. . . because he can always count on Victor to fill his needs. Shown here is one of Victor's **new** LPCG series . . . available for both hand and machine cutting with **new** natural and propane preheat gas cutting tips.

Remember, Victor torches perform best when you use genuine Victor cutting tips. Order from your Victor dealer now and cut your costs with Victor cutting tips.

VICTOR for welding

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VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; high pressure and large volume gas regulators; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

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J. C. Menzies & Co., Wholly-Owned Subsidiary

TYPES AND CAPACITIES— MINSTER® PRESSES—A COMPLETE LINE

SINGLE POINT, GAP TYPE, OPEN BACK



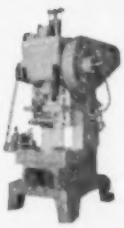
Series 1
Inclinable
6 Capacities
12 THRU 60 TONS
Bulletin Section 1



Series 1
Inclinable
Two Capacities
75 THRU 90 TONS
Bulletin Section 2



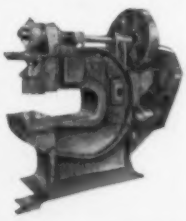
Series 70
Fixed Base
Four Capacities
45 THRU 90 TONS
Bulletin Section 3



Series B1
Fixed Base, Automatic
Five Capacities
16 THRU 60 TONS
Gap Press Bulletin

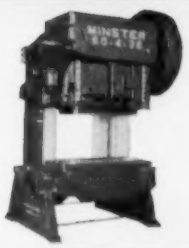


Series G1
Fixed Base or Inclinable
Four Capacities
75 THRU 250 TONS
Bulletin Series G1

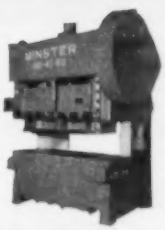


Series 20
Deep Throat Type
Three Capacities
15 THRU 35 TONS
Gap Press Bulletin

TWO POINT, GAP TYPE, OPEN BACK



Series 60
Inclinable—Five Capacities
22 THRU 75 TONS
6 Widths Ea. Cap.
Request Specifications

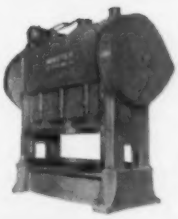


Series 80
Fixed Base—
Five Capacities
22 THRU 75 TONS
6 Widths Ea. Cap.
Request Specifications

STRAIGHT SIDE PRESSES



Series S1
Twelve Capacities
50 THRU 600 TONS
Bulletin Series S1

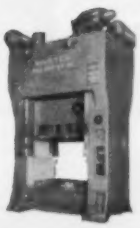


Series S2
Ten Capacities
50 THRU 400 TONS
Five Widths Ea. Cap.
Bulletin Series S2

STRAIGHT SIDE PRESSES — M SERIES

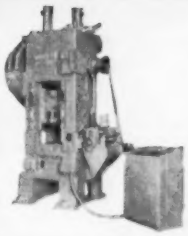


Series MS1
Three Capacities
300 THRU 500 TONS
Request Specifications

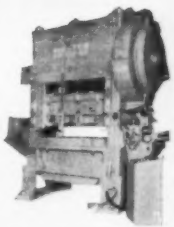


Series MS2
Five Capacities
150 THRU 500 TONS
Five Widths Ea. Cap.
Bulletin Series MS2

PIECE-MAKER AUTOMATIC PRODUCTION PRESSES



Series P1
Three Capacities
75 THRU 150 TONS
Bulletin Series P1



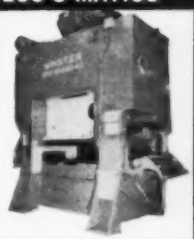
Series P2
Nine Capacities
20 THRU 300 TONS
Four Widths Ea. Cap.
Bulletin Series P2

KNUCKLE JOINT PRESSES



Series 90
Six Capacities
150 THRU 1000 TONS
Bulletin Series 90

PROGRESS-O-MATICS



Series PMS2
Five Capacities
150 THRU 500 TONS
Five Widths Ea. Cap.
Request Specifications

HORNING PRESSES



Series 10
Eight Capacities
16 THRU 90 TONS
Bulletin Series 10

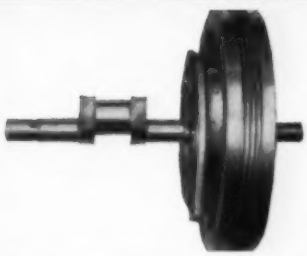
HEAVY DUTY BLANKER



40E-9
400 TON
Bulletin 40E-9

CLUTCH CONVERSIONS

Minster patented Combination Air Friction Clutch and Brake unit for clutch conversions increases production, reduces maintenance.
Bulletin CC57



MINSTER®

THE MINSTER MACHINE COMPANY

MINSTER, OHIO

FIRST IN PRESS DESIGN

MINSTER MACHINE COMPANY
MINSTER, OHIO

Gentlemen: Please send me a copy of Bulletin_____

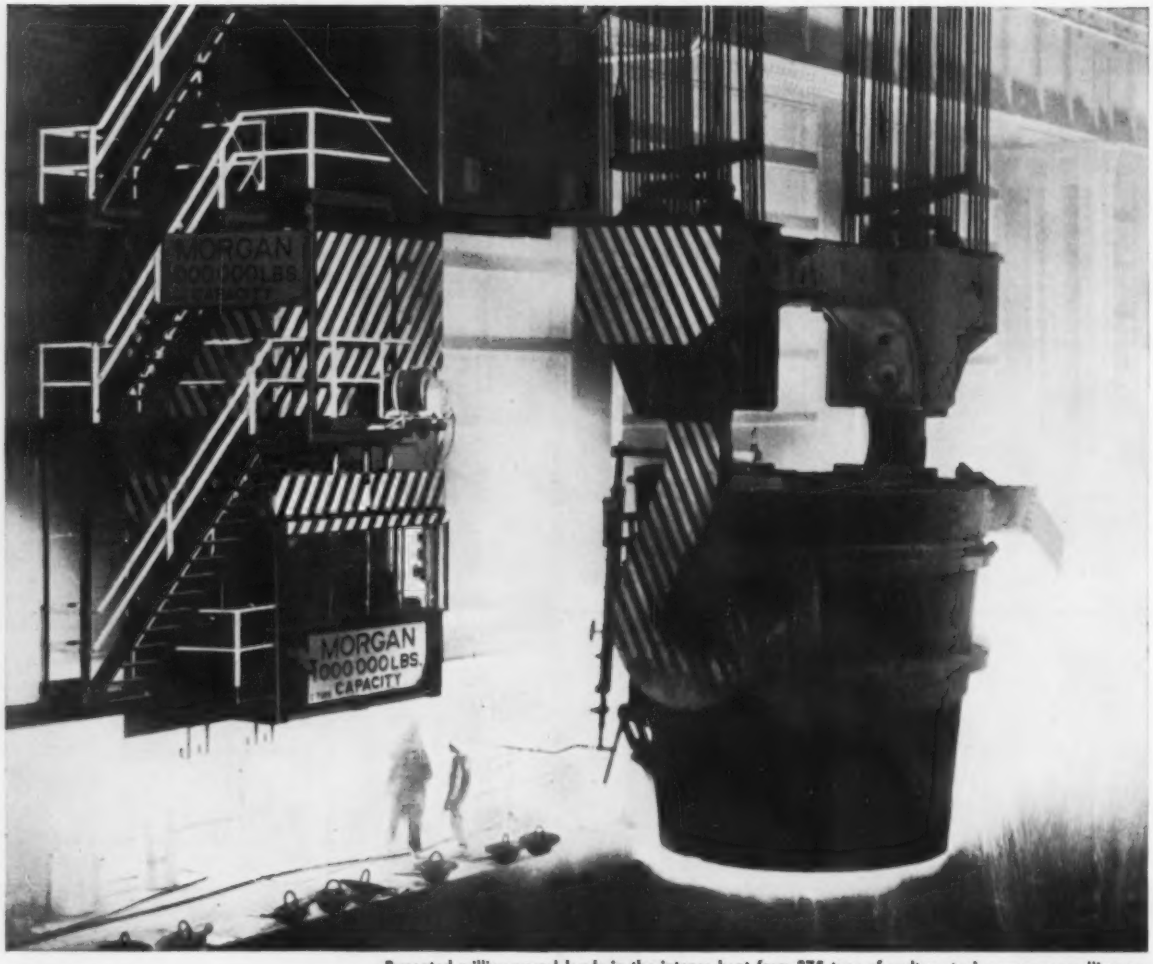
Name_____ Title_____

Company_____

Address_____

City_____

Nature of Product_____



Repeated million-pound loads in the intense heat from 375 tons of molten steel, cause no spalling or deformation of Rollway Bearings.

1,122,000 Pounds Ride on 68 Rollway Bearings

One of the largest in the world, this 500-ton Morgan-built ladle crane is Rollway equipped in many positions.

Sixty-eight maximum-type, solid-cylindrical bearings—mounted without inner races—lift and lower the 1,122,000-pound weight of the lifting beam, ladle hooks, ladle and white-hot steel.

Rollway Tru-Rol® type bearings are used in the two General Electric 360 HP – MD-620 Hoist motors which lift the weight of the ladle and its molten metal content.

The maximum-type bearings in the hoisting sheaves are mounted directly on the shaft without inner races, which greatly simplifies assembly for applications of this size.

Thrust bearings in the 25-ton and 75-ton auxiliary crane hooks are standard Rollway precision types with broad-area contact between rollers and plates to prevent Brinelling and assure freedom of rotation under the heaviest loads.



Sheaves ready for assembly on shaft and installation in lifting beam.

For bearings that accomplish the extraordinary in an ordinary manner, write, wire or 'phone Rollway Bearing Co., Syracuse 1, N.Y.

ROLLWAY® BEARINGS

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Seattle • Houston • Philadelphia • Los Angeles • San Francisco

Rolls and Rolling Mill Equipment

For more than half a century the name "Hyde Park" on Rolls and Rolling Mill Equipment has identified them as tops in excellence of manufacture, in precision of operation and in long trouble-free performance. Yes, "Hyde Park" is known throughout the industry as the mark of quality.

We will be glad to work with you in solving your mill equipment problems.

Rolling Mill Equipment

Bar Mills • Merchant Mills • Sheet and Strip Mills • Pinion Stands • Roller Tables • Reduction Drives • Stretcher Levellers • Sheet Mill Shears • Roll Lathes • Special Machinery • Machine Work

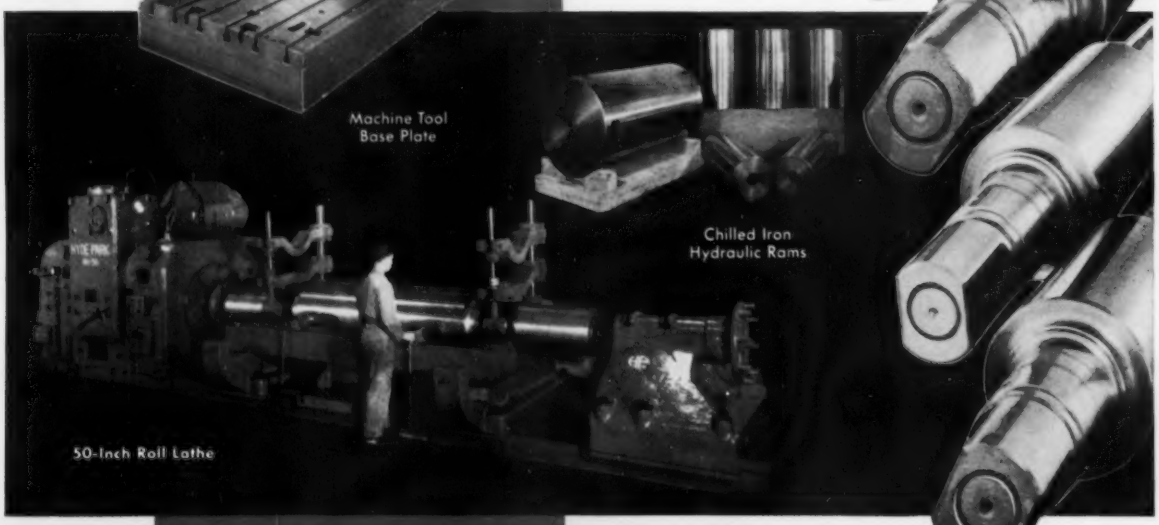
A "Red Circle" Roll for Every Purpose

Alloy Iron Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Cold Rolls

Gray Iron Castings up to 80,000 lbs.



18 inch 3 high Bar Mill Stand



Machine Tool Base Plate

Chilled Iron Hydraulic Rams

50-Inch Roll Lathe

Hyde Park FOUNDRY and MACHINE CO.

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

WORLD'S LARGEST

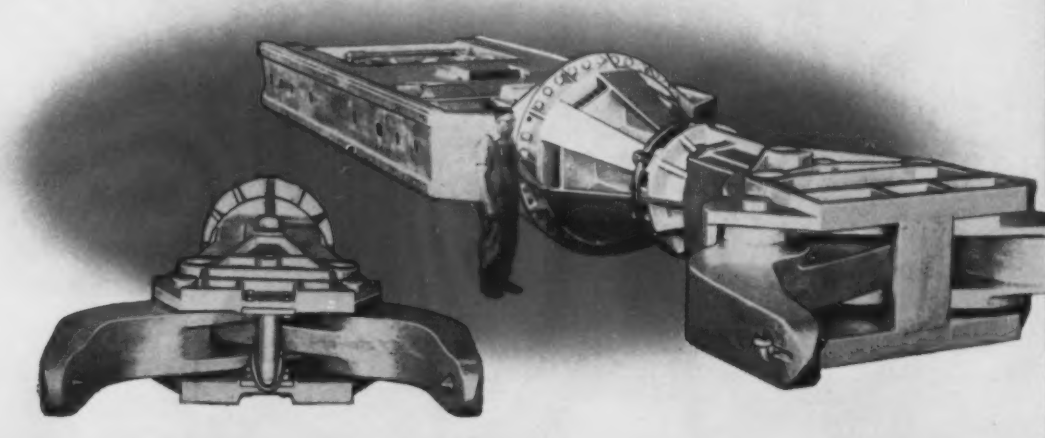


• This 75-ton intensified grip soaking pit crane installed at the Lukens Steel Company, Coatesville, Pennsylvania, has more than twice the capacity of any soaking pit crane ever built.

The complete range of slabs and ingots produced, from 30″ minimum to 125″ maximum, is handled by two tong heads which can be interchanged in a matter of minutes. If your material-handling problems involve big lifts or transfers, Alliance engineers in Alliance or Miami will solve them . . . quickly and economically.

INTERCHANGEABLE TONG HEADS

• To afford better visibility when handling small ingots, the small tongs can quickly be installed on the column. These small tongs have a range of 30″ minimum to 86″ maximum. Range of the large tongs is 65″ minimum to 125″ maximum.



THE ALLIANCE MACHINE COMPANY

Main Office • Alliance, Ohio Branch Office • Miami, Florida

"GIVE US THE RUNWAY AND WE'LL LIFT THE WORLD"

Soaking Pit Cranes

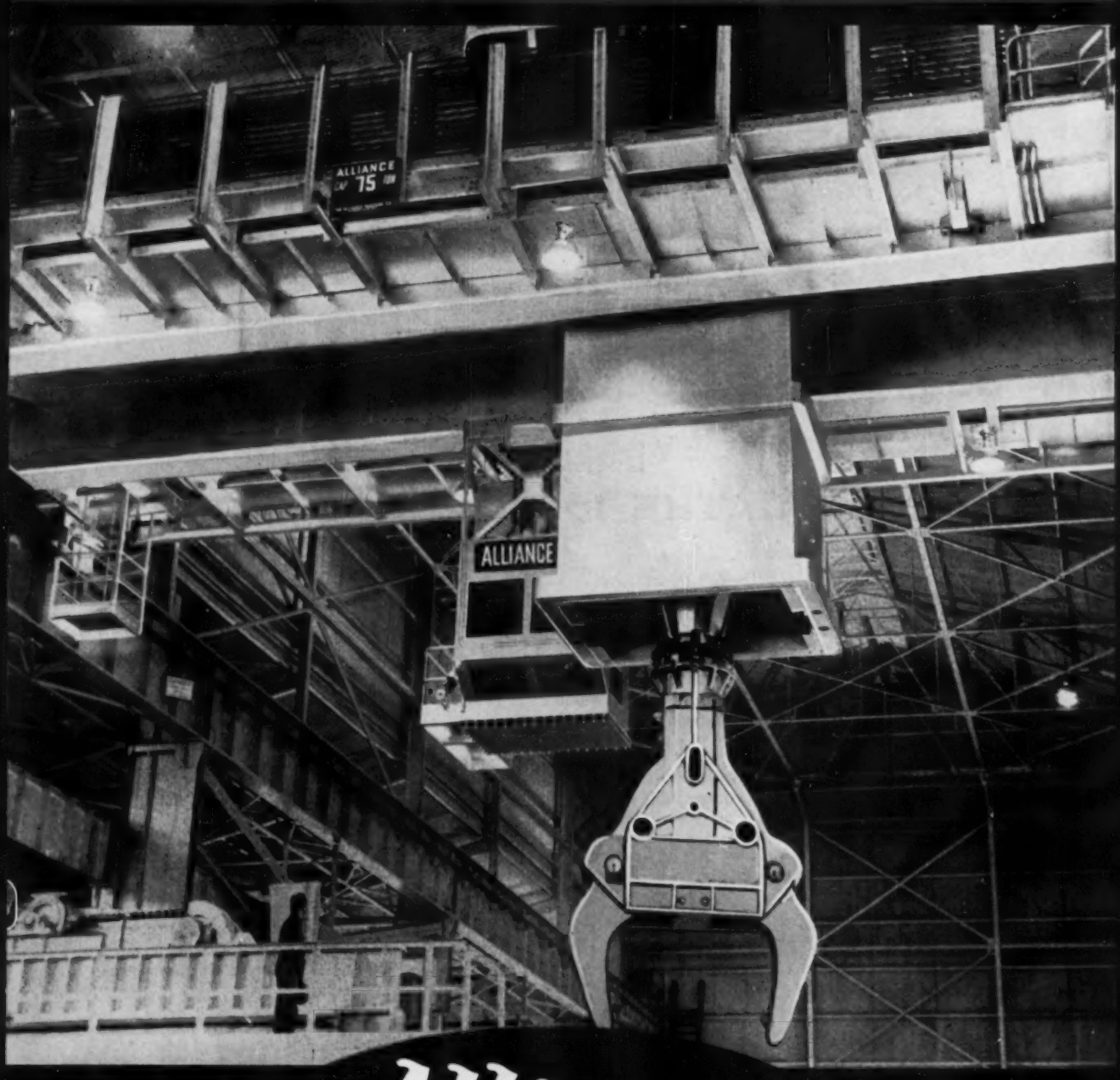


Photo Courtesy Latrobe Steel Company, Connellsville, Penna.

Alliance

CABLE CRANES • GANTRY CRANES • FORGING MANIPULATORS • SOAKING PIT CRANES • STRIPPER CRANES • SLAB & BILLET CHARGING MACHINES
OPEN HEARTH CHARGING MACHINES • SPECIAL MILL MACHINERY • STRUCTURAL FABRICATION • COKE PUSHERS • LOADING AND UNLOADING TOWERS

why use GOLIATH when "DAVE" can do the job at **1/2** the cost?

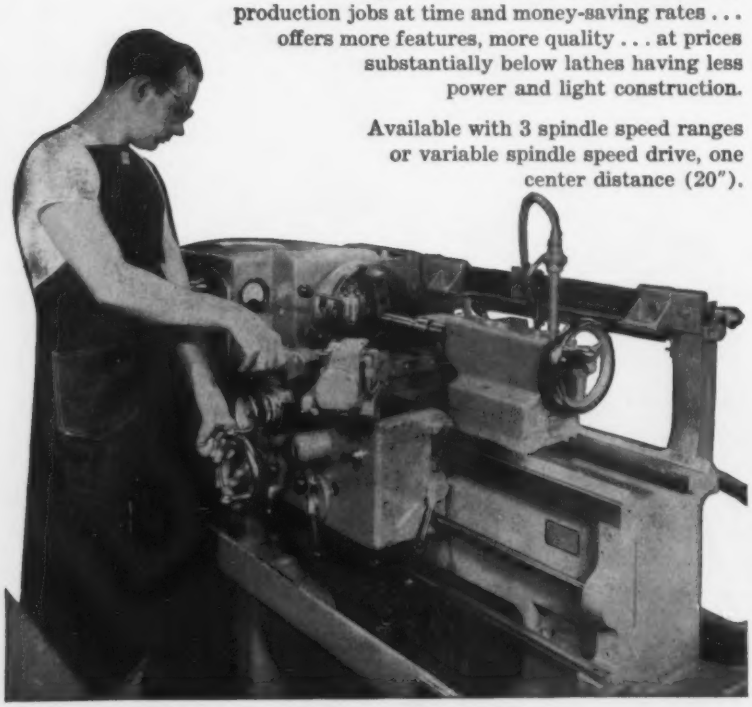


don't pay $20,000 when you can buy a LODGE & SHIPLEY Hi-Turn COPYMATIC TRACER LATHE for less than $10,000

A too-big, too-expensive tool doesn't mean you'll do the job quicker, better or at lower cost. There's new proof of that fact . . . in the 1307 (10") HI-TURN 45° COPYMATIC Tracer Lathe!

This rugged and versatile lathe is built to do production jobs at time and money-saving rates . . . offers more features, more quality . . . at prices substantially below lathes having less power and light construction.

Available with 3 spindle speed ranges or variable spindle speed drive, one center distance (20").



"EXCELLENT FOR HIGH PRODUCTION ON SMALL PARTS," says Indiana Gear Works, Indianapolis

This well-known precision gear manufacturer has a number of Lodge & Shipley lathes in a busy plant. The latest is a Hi-Turn COPYMATIC, evaluated as follows:

SPEED RANGE:
"The wide range of speeds available on this machine is definitely an advantage."

FEED RANGE:
"We are able to select the correct feed for all parts run on the machine."

DINABRAKE MOTOR:
"Speeds production."

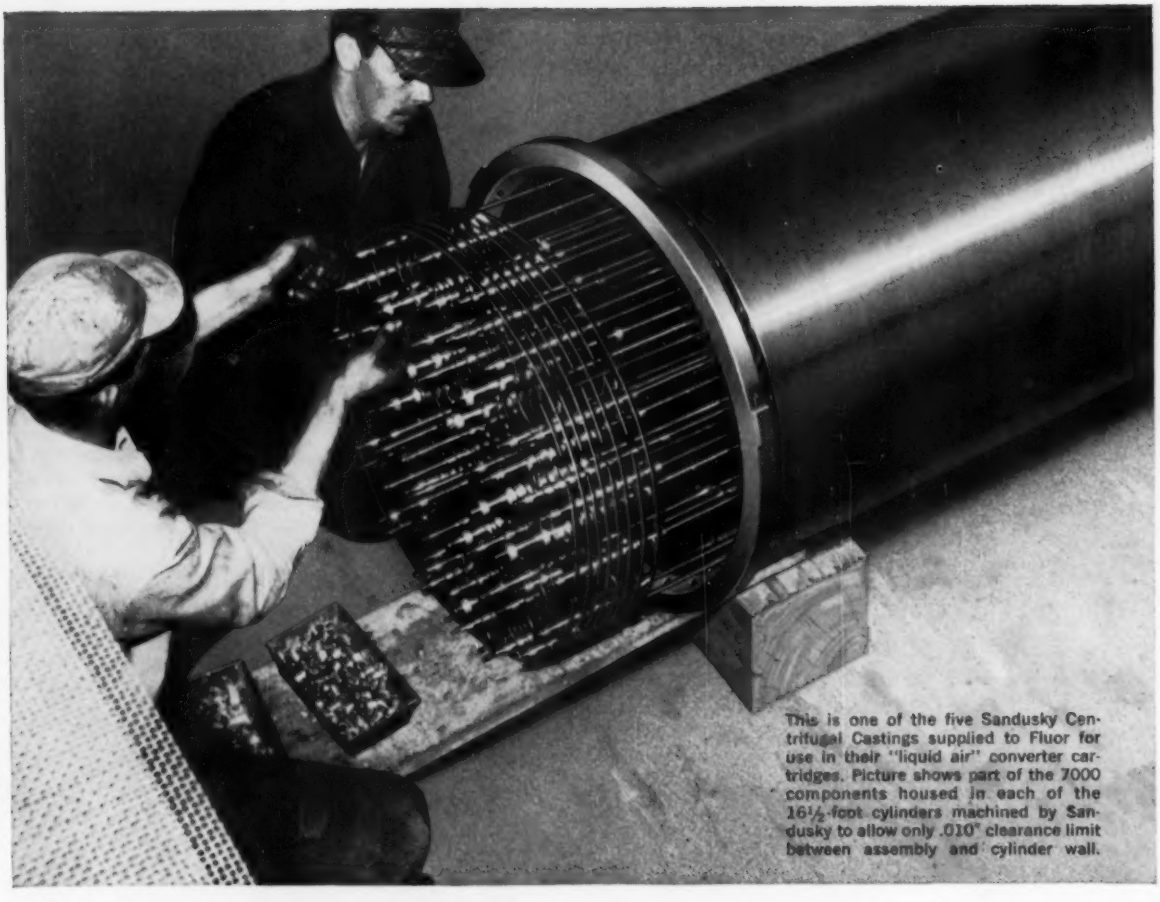
HP AMMETER:
"Enables the operator to run the machine at full capacity."

DESIGN:
"Compact, provides ease of set-up."

ACCURACY:
"Good."

For complete details, request Bulletin DM-4 from:

The Lodge & Shipley Co.
3073 Colerain Ave.
Cincinnati 25, Ohio



This is one of the five Sandusky Centrifugal Castings supplied to Fluor for use in their "liquid air" converter cartridges. Picture shows part of the 7000 components housed in each of the 16½-foot cylinders machined by Sandusky to allow only .010" clearance limit between assembly and cylinder wall.

SOLVED by Sandusky Centrifugal Castings:

This difficult precision-cost-delivery problem for the FLUOR PRODUCTS COMPANY.

Sandusky Quality Centrifugal Castings

Types: Rolls, Sleeves, Rings, Bearings, Bushings, Liners, Bands, Drums, Cylinders, Tubes, Shells, Retorts, Pressure Vessels, Pressure Piping

Sizes: From 7" to 54" O.D.—Lengths up to 33 feet

Materials: Stainless, Carbon and Low-Alloy Steels; full range of Copper-Base and Nickel-Base Alloys

Dimensional stability of Sandusky Centrifugal Castings enabled the Fluor Products Company to fit more than 7,000 precision parts into each of 5 identical cylinders supplied by Sandusky for use as ammonia synthesis converter cartridges.

Centrifugally cast of a modified CF8 (Type 304L) stainless steel, each cylinder was machined to finish dimensions 27¾" O.D., 26⅝" I.D., 199" long. The bore, surface finished to 35 micro inches, was held to .005" maximum out-of-roundness and .008" maximum taper.

What is more important, to meet Fluor's difficult assembly problems these large cylinders would have to be able to retain these carefully machined dimensions.

"The Fluor Products Company Engineers selected Sandusky Centrifugal Castings because of the stringent specifications, critical delivery requirements and competitive cost of this project. This was the first experience with such centrifugally cast products by the Fluor Products Company; and, the Sandusky Foundry and Machine Company people assisted in making this an extremely satisfactory and profitable project."

While you may have entirely different cylindrical design requirements, Sandusky Centrifugal Castings may well provide a similar cost-cutting answer. We would be pleased to have your inquiries.

SANDUSKY (S) *CENTRIFUGAL CASTINGS*

FOUNDRY & MACHINE CO.

SANDUSKY, OHIO Stainless, Carbon, Low Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

this 140-TON horizontal milling machine

also bores and turns

There's never been one like it before!

Just a press of a button puts this mighty Schiess into action. A 25-ft. high column moves smoothly along 45-ft. long bedways. Never a vibration—no chatter—even at maximum transversal loads! The new Schiess design of the spindle heads has eliminated this!

THE MILLING OPERATION. A huge tungsten-carbide cutter in a 14¼" spindle goes to work on the stock. And performs its operation with a consistent accuracy—a surface-finish count—never before obtainable on such a big fellow.

THE BORING OPERATION. Another press of a button! Another spindle goes to work—bores a 79" depth in one cut—or a total depth of 118". Boring and milling spindles are provided with 36 speeds of which the top 12 are V-belt transmitted. Rapid traverse, feeds and manual controls of the two spindles are completely independent.

That this mighty machine has tremendous productive capacity is self-evident. And its productivity goes far beyond conventional milling and boring. Schiess attachments increase its scope to taper-milling, thread-cutting, copying and, in certain instances, copying in 3 dimensions. It's a time saver, too. Can go from feed to rapid traverse immediately, without complicated adjustments.

The Schiess Model FB 36/22.5 Horizontal Milling and Boring Machine is a product of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess Engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on all five FB models.



Face milling entire side of 38' x 14' press frame on Schiess Model FB 36/22.5

engineering division

SCHIESS

AMERICAN SCHIESS CORPORATION

1232 Penn Avenue, Pittsburgh 22, Pa.

this 480 ton giant has 5 heads



WALDRICH SIEGEN

combined planer and milling machine

No need to risk the inaccuracies that come from moving a workpiece weighing up to 100 tons from machine to machine for different operations. One set-up is all you need with this Waldrich Siegen machine. And just think of the tremendous savings in set-up time and costs.

Three milling heads take care of milling, boring and thread cutting operations; another head does planing and grinding; and there's a planer side head, too.

The Waldrich patented tool retracting mechanism in the planer head raises tool in a straight vertical plane after unclamping, repositions tool automatically, then reclamps. Cross rail is clamped hydraulically in exact horizontal position, located by separate electric drive. Built-in optics confirm accurate location.

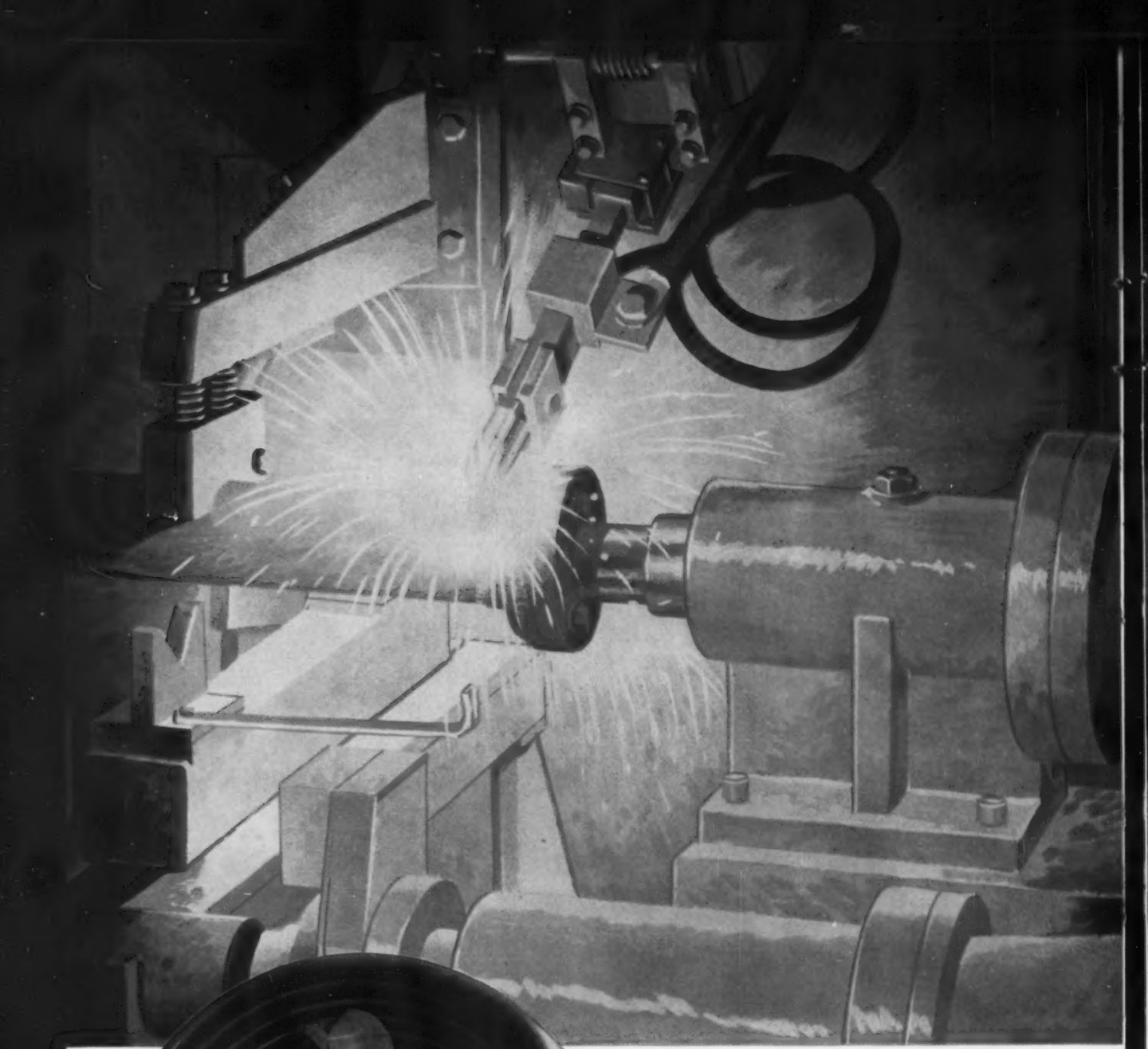
Rigid, you bet—from top to bottom! Waldrich construction features a base plate crossing under machine and tying columns and bed into one ruggedly rigid unit. And there's a total of 900 h.p. working for you.

Write for all the specs on this mammoth producer. And ask a Waldrich engineer to discuss them in detail—in terms of your production needs.

WALDRICH SIEGEN

american waldrich mfg. corp.

1232 PENN AVENUE, PITTSBURGH 22, PENNSYLVANIA





West-Ing-Arc® Dynamic Reactor greatly enlarges the fields of applications for welding and results in many "plus" benefits at a small investment to the user of any semiautomatic or fully automatic welding process equipment employing constant potential (voltage) power source.

If you presently use West-Ing-Arc equipment, or contemplate its use—the addition of the Dynamic Reactor results in cost-cutting extras . . . in addition to the efficiencies already inherent in the West-Ing-Arc process.

Order this versatile addition to your present equipment *now!* Or write for complete details on how this equipment can result in savings. Address: Dynamic Reactor, Welding Division, Westinghouse Electric Corporation, 4454 Genesee Street, Buffalo 5, New York. J-22140

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS," CBS TV MONDAYS

A "triple cost-cutting" **EXTRA** for welding stainless, mild steels and aluminum

The NEW WEST-ING-ARC®

DYNAMIC REACTOR

FOR USE WITH AUTOMATIC AND SEMIAUTOMATIC GAS SHIELDED, DC WELDING EQUIPMENT UTILIZING CONSTANT POTENTIAL POWER SOURCES

"ALL-POSITION" WELDING!
Overhead—vertical up—and down! Stability of arc at reduced setting.

REDUCED ELECTRODE WIRE COSTS!
Use at least one size larger diameter wire with no change in current setting, voltage or feed speed. Cost reductions from 1¢ to 17¢ per pound of deposited weld metal.

GREATER VERSATILITY!
Light-gauge metals now may be arc welded. No slag removal problems; practically no "spatter" . . . finished products are ready to paint or plate. CO_2 gas shielding for mild steel hand gun welding is practical!



STYLE 565D956G01

STYLE 427C503G01

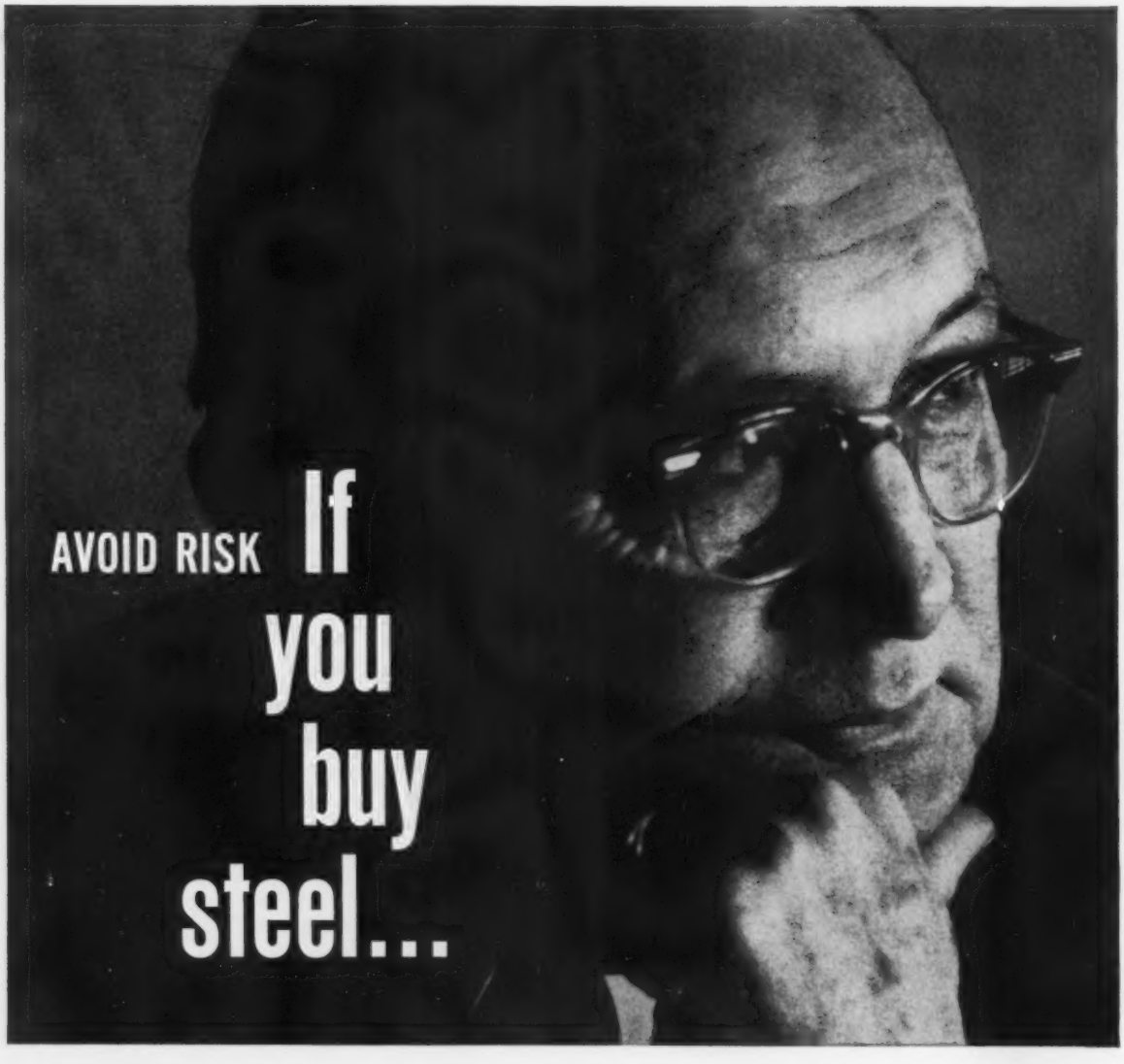
2 LOW-COST, DUAL-RATED MODELS

- Style 427C503G01—150/300 amperes 100% duty cycle—Zone 1 price* **$159**
- Style 565D956G01—300/600 amperes 100% duty cycle—Zone 1 price* **$259**

* Slightly higher in Zones 2 and 3

ORDER NOW!

Watch Westinghouse for New Developments in Welding!



USE OUR CAPITAL to cut your handling and processing costs

When we do a share of the processing of your steel—the cutting, burning—you save the costs of the labor it takes and the capital invested in the equipment involved. You save expensive costs of handling. You cut scrap loss and wastage. That's good business.

You get your steel delivered quickly from stock, ready for use. Whatever your steel need, there's a nearby Steel Service Center set up to serve you.

If you're putting steel in inventory because you think it's a bargain, compare *all* of your *costs of possession* with the cost and *freedom-from-risk* of buying from your Steel Service Center. Use this chart. Or, to be more precise, get the booklet *What's Your Real Cost of Possession for Steel?* from your convenient Steel Service Center. American Steel Warehouse Association, Inc., 540 Terminal Tower, Cleveland 13, Ohio.

COST OF POSSESSION FOR STEEL IN YOUR INVENTORY

Per ton delivered	_____
Cost of capital:	
Inventory	_____
Space	_____
Equipment	_____
Cost of operation:	
Space	_____
Materials handling	_____
Cutting & burning	_____
Scrap & wastage	_____
Obsolescence	_____
Insurance	_____
Taxes	_____
TOTAL	_____

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

Per ton, cut-to-size, and delivered

TOTAL _____

AMERICAN STEEL WAREHOUSE ASS'N

The American Steel Warehouse

...YOUR STEEL SERVICE CENTER

Quality steps up...
costs **trend down**
when you switch to



brass
copper
aluminum
mill products
bearing
this trademark

If you are planning a new product, let Scovill Technical Service help you select the proper alloy, temper, finish, etc., to bring out the BEST in it . . .

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

SCOVILL

SCOVILL MANUFACTURING COMPANY
MILL PRODUCTS DIVISION
99 MILL ST., WATERBURY 20, CONN.
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made better to bring out the BEST in your products

your metals problems



find answers here...

"Engineers in our Metals Research Department think like fabricators and act like watchdogs in maintaining these superior standards for Scovill Mill Products...

UNIFORMITY in metal composition that is unsurpassed in the industry.

CONTROL of temper and grain size without significant variation...order to order, lot to lot.

MINIMUM tolerances on width, thickness, length, straightness, and other critical customer specifications.

FREEDOM from surface and internal defects.

The industry's most advanced, convenient PACKAGING methods.

"The answers to most fabricators' metals problems can be found in these superior qualities of Scovill Mill Products... made better through close quality control to bring out the BEST in *your* products."

Walter D. France, Assistant Director, Metals Research Department.



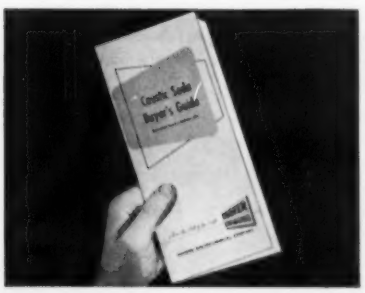
BRASS COPPER ALUMINUM

65C58

Scovill Manufacturing Company, Mill Products Division, 99 Mill St., Waterbury 20, Conn. Phone Plaza 4-1171.

BRIEFS

on a handy booklet for anyone who buys caustic soda... how to keep arsine out of pickling baths... how to cut degreasing costs... a chemical for electroless nickel plating



Caustic Soda Buyer's Guide offers fast facts

Quick answers to questions on caustic soda abound in this pocket-sized booklet.

You'll find in it basic information on forms and grades, containers and shipping methods.

One section deals with the comparative economics of 50% and 73% liquids solutions. It includes a table and nomograph to help you decide which concentration is the *better* buy for *you*.

Another nomograph helps you estimate instantly how much caustic of a given strength you need to get a given volume of your process solution.

We've also pointed out some factors you might consider when choosing a supplier.

Just clip the coupon for a copy.

How to help keep arsine out of pickling baths

If there is any arsenic in the muriatic acid you use for pickling, it can combine with free hydrogen to form arsine, a dangerous compound to have around.

Arsenic can also be reduced to the metal, leaving spots on the articles you pickle.

All this makes us happy that there is not a bit of arsenic in either of the grades of muriatic acid we sell. In fact, the level of all impurities is quite low. Sulfates check in at a low 0.003% in both our Commercial Grade and Hooker White Grade. There's less than 0.0005% iron in Commercial, less than 0.0001% in Hooker White.

We ship both grades in 18°, 20°, and 22° Baumé solutions in rubber-lined tank cars. Literature will be sent upon coupon request.

Are your degreasing costs too high?

If they are, one reason may be that you have to constantly add new stabilizers to the trichlorethylene you use.

If you are one of those who have to titrate baths frequently and then freshen them up, you may be surprised to learn that there is a trichlor you never have to add stabilizer to—NIALK® TRICHLOR.

NIALK, and only NIALK, has *psp* —permanent STAYING power—in its neutral stabilizer. This stabilizer just does not wear out during normal use. Even after repeated distillation, it's still active, still protecting your trichlorethylene against heat, light, air, moisture, acids, and active metals.

If you'd like to know more about this stable trichlorethylene, send us the coupon.

Electroless nickel plating with $NaH_2PO_2 \cdot H_2O$

There's been a lot of activity of late in the electroless nickel plating of metallic and plastic objects by co-deposition of metals and metallic phosphides.

This probably explains the increased business we're enjoying with our sodium hypophosphite, commercial grade.

Our free-flowing, white, odorless crystals are available in 25- and 100-lb. fiber drums.

Our technical data sheet is offered in the coupon.

For more information on the chemicals mentioned on this page, check here:

- ☐ Caustic Soda
- ☐ Muriatic Acid
- ☐ Trichlorethylene
- ☐ Sodium Hypophosphite

Keep your file current with data on these other Hooker chemicals:

- ☐ Virgo® Descaling Salt
- ☐ Virgo Electrolytic Salt
- ☐ Virgo Molten Cleaner
- ☐ Oxalic Acid

Clip and mail to us with your name, title, and company address. (*When requesting samples, please use business letterhead.*)

HOOKER CHEMICAL CORPORATION
310 UNION STREET, NIAGARA FALLS, N. Y.

Sales Offices: Chicago Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

Republic ELECTRUNITE Mechanical Tubing

...facilities and abilities save production time, materials, costs!

This story is a typical example of how Republic's ELECTRUNITE® Mechanical Tubing—in rounds, squares, rectangles, can work for you.

Syncro Corporation, Oxford, Michigan, manufactures quality jig saws for home workshops. Previously, they used a casting for the blade-yoke which requires a severe bend. ELECTRUNITE Square Tubing was recommended for one model, rectangular tubing for the other.

Results: Reduction of weight of the blade-yoke and improvement in the appearance of the product, at a savings in time, materials, assembly, and shipping costs.

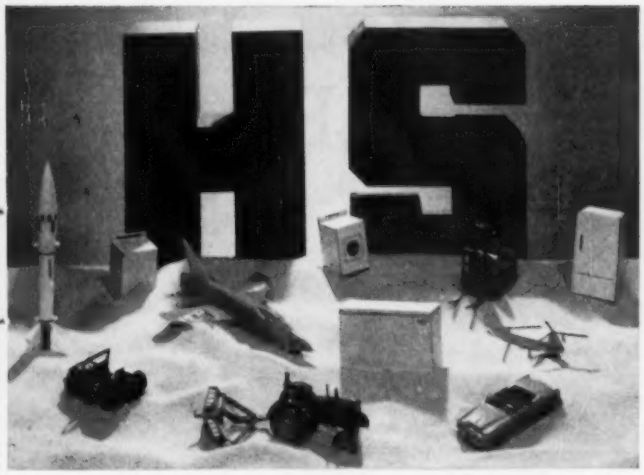
ELECTRUNITE solved this problem because Republic Mechanical Tubing is produced with the ability to withstand severe bending. In both models, ELECTRUNITE Mechanical Tubing is bent a full 180° without noticeable distortion or loss of strength.

Republic's Steel and Tubes Division has the facilities, equipment, and "know-how" to fabricate all grades and types of ELECTRUNITE carbon and stainless tubing into whatever shapes your product requires.

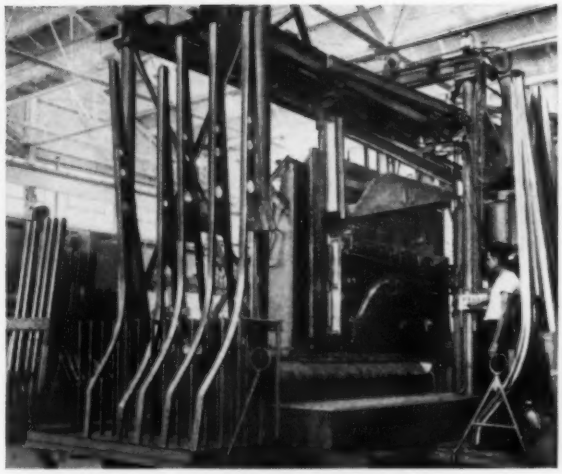
Learn more about the problem-solving advantages of Republic ELECTRUNITE Mechanical Tubing. Call your Republic representative, or write direct.

SYNCRO CORPORATION manufactures quality jig saws for home workshops. Blade-yokes, made of Republic ELECTRUNITE Square and Rectangular Tubing bent a full 180°, are fabricated at Republic's Steel and Tubes Plant, Ferndale, Michigan.



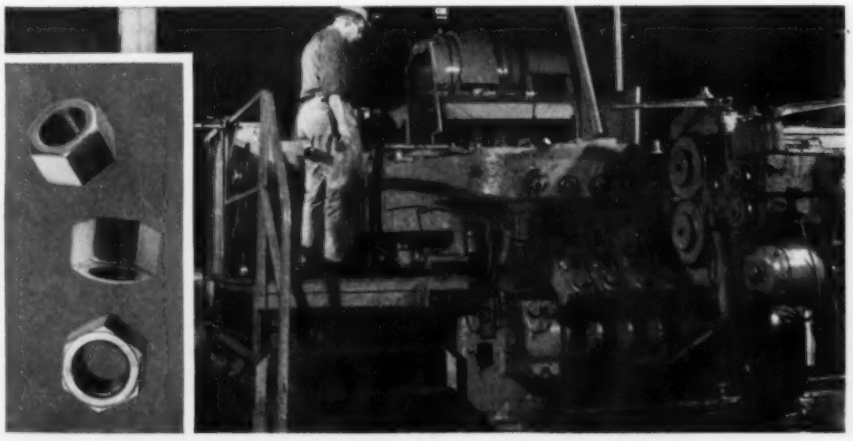


REPUBLIC'S NEW HIGH STRENGTH POWDER, TYPE 6460, opens the way to new markets for new applications using sintering for highly stressed parts. Type 6460 can be used with existing operating equipment. It provides a minimum tensile strength of 60,000 psi at 6.4 density as sintered, 100,000 psi heat treated. Type 6460 maintains its dimensional characteristics after sintering—less than .004 inches per inch shrinkage from die size at 6.4 density. Available in production quantities up to and including 12 tons, or in multiples thereof. Mail coupon for data.



REPUBLIC ALLOY STEEL SOLVES STRENGTH/WEIGHT PROBLEM. Rohr Aircraft Corporation, Chula Vista, California, is currently manufacturing flap tracks for an Air Force bomber fabricated from AMS 6428 Alloy Steel, with minimum tensile strength of 180,000 psi in the heat treated condition. Uniform response to heat treatment assures exceptionally deep hardening characteristics. Exceptionally high strength-to-weight ratio combined with highest strength values permits the design of thinner, lighter track sections. Save weight, hold down size without sacrifice of strength or safety. Send coupon for data.

THERE IS SATISFACTION in knowing that when you specify Republic Fasteners, you can count on consistent uniformity from one unit to the next, year in and year out. You get unswerving quality and dependability in each fastener, in any quantity. Skilled workmen, using modern production equipment like the nut former shown at right, maintain uniform quality in each type of fastener. Your Republic Bolt and Nut Division representative or distributor will be glad to work with you to make sure you get exactly the right fastener to suit your application. Send coupon for full information on types and sizes.



REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send additional information on the following:

- ☐ Republic ELECTRUNITE Mechanical Tubing
- ☐ Republic High Strength Powder, Type 6460
- ☐ Republic Alloy Steel
- ☐ Bolts and Nuts
- ☐ Have a metallurgist call

Name_____ Title_____

Company_____

Address_____

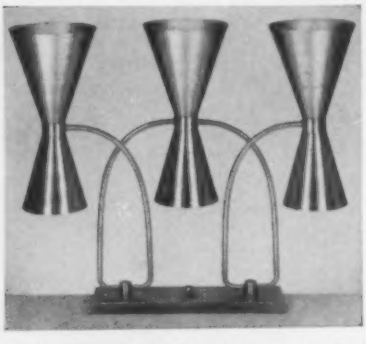
City_____ Zone____ State_____

BRIDGEPORT BRASS
COPPER ALLOY BULLETIN

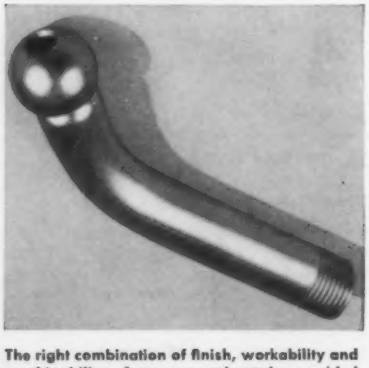
Reporting New Developments in Copper-Brass Alloys and Metalworking Methods



Conductivity and fast, low-cost fabrication are qualities Bridgeport tube supplies for parts like this automatic transmission cooling unit (left) and this defroster coil (right).



High quality surface finish and easy workability are specified—and supplied by Bridgeport—in tube used in modern lamps like these.



The right combination of finish, workability and machinability—features no other tube provided—were the reasons why All American Mfg. Co., Los Angeles, Calif., chose Bridgeport Yellow Brass Tube for this ball arm for shower heads.

WHY IT PAYS TO FABRICATE WITH BRIDGEPORT SEAMLESS TUBE

Bridgeport brass and copper seamless tube is an unusually versatile metal form which has a host of qualities, characteristics and uses few other metals can provide. Used in lamps, andirons, automotive parts, cooling units, furniture and other items, it fills a wide range of product and production requirements.

Why Seamless Tube?

Fabricators select Bridgeport Seamless Tube for many reasons. Its beauty and warmth lend much to the appeal of consumer products, for example. And its corrosion resistance and rustproofness make it desirable where other metals fail. Another important plus factor of seamless tube is its easy workability. Machining, bending, forming, cutting and cupping all are easier. Its wonderfully smooth surface finish simplifies polishing and plating. Close OD, ID and wall-thickness tolerances are maintained. This simplifies fabricating, keeps costs down and insures more uniform end products.

Economy...

In addition to the fabrication savings mentioned, additional economies are realized with Bridgeport Seamless Tube because it is produced in long lengths to insure uninterrupted production runs.

Characteristics...

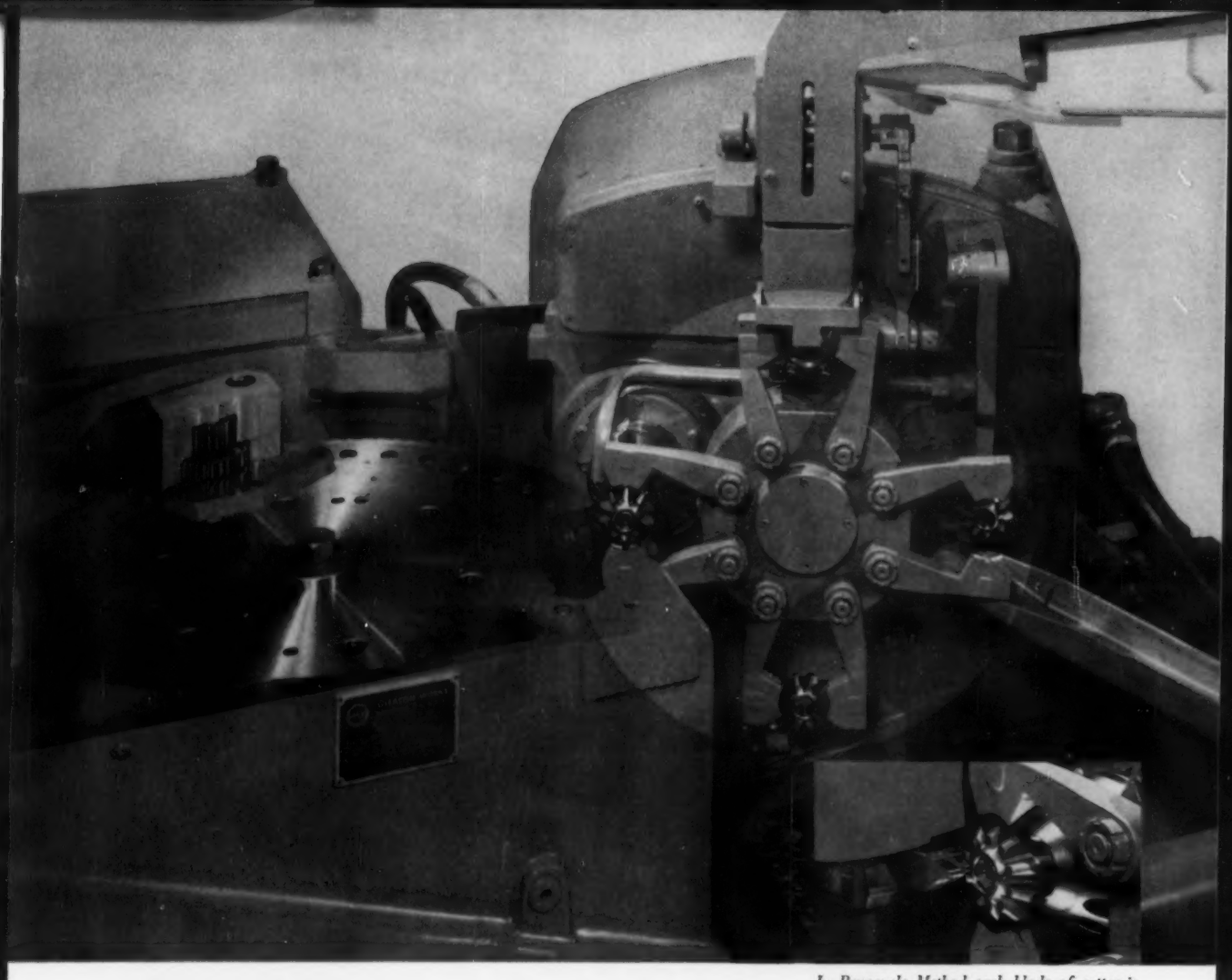
Still another advantage is the wide range of characteristics available. You can specify combinations of mechanical, physical and fabrication properties as well as tempers to suit every need.

And Quality...

Made in one of the country's most modern tube mills, Bridgeport tubes are checked and inspected at every stage of manufacture to assure adherence to specifications. Bridgeport's other tests cover surface finish, interior strength, accuracy of gage and diameter, chemical analysis, strain, expansion and microstructure.

Find Out More

...about Bridgeport Seamless Tube in a wide range of brass or copper alloys for use in fabricating. Our Technical Service Men can help you solve application problems. Just call your nearest Bridgeport Sales Office, or, if you prefer, write direct to Bridgeport Brass Company, Bridgeport 2, Connecticut, Dept. 3402.



In Revacycle Method each blade of cutter is longer than its predecessor; there is no depthwise feed of cutter itself. One rotation of the cutter completes each tooth from the solid.

Fastest way yet to cut straight bevel gears

If you're looking for a faster, fully automatic way to cut straight bevel gears and pinions with conjugate surfaces and localized tooth bearings, consider the Gleason No. 109 Straight Bevel Revacycle® Machine.

You rough, semifinish, and finish a gear from the solid blank with a single rotation of the Revacycle cutter.

Now both 21″ and 25″ diameter cutters can be used on the No. 109 Revacycle Machine. The 25″ cutter cuts gears to a maximum depth of 0.600″. The 21″ cutter will cut to a maximum of 0.400″.

A new, completely automatic mechanism loads and unloads each gear. You can feed this loader manually or with a conventional belt conveyer.

The No. 109 Machine handles a wide range of automotive and farm machinery gears: up to 10″ diameter, 5:1 ratio, 1¼″ face width.

Send for our bulletin for information on both the machine and the Revacycle Method.



Storage unit and flight conveyer can be fed manually or with belt conveyer. Even with manual operation, one operator can handle a battery of machines.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.



Versatile ACIPCO SPUN TUBES

Stainless steel, carbon steel, alloy iron or special analyses—versatile ACIPCO tubes are "custom-spun" to the exact physical, chemical and metallurgical specifications required by design, manufacturing and end-use conditions.

Because they are centrifugally spun, the metal grain structure of ACIPCO tubes is dense, non-directional and porosity-free. This *superior* grain structure not only makes ACIPCO tubes easier to machine to close tolerances, but also results in greater strength and durability. In addition, the inherent dimensional stability and concentricity of ACIPCO tubes make dynamic balance easier to attain in finished products.

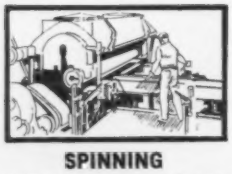
ACIPCO's complete, integrated facilities for casting, heat-treating, machining, fabricating and testing offer the additional advantages of "one source—from start to finish" service.

Call or write today for information about ACIPCO tube applications in your field, or for expert technical assistance on your specific tubular metal problem.

SIZE RANGE: Lengths up to 410" have been produced to meet modern machinery requirements. OD's from 2.25" to 50"; wall thicknesses from .25" to 4".

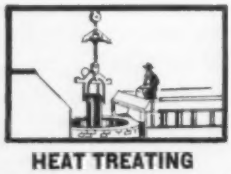
ANALYSES: All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steel, plain carbon steel and special analyses.

FINISHED: As cast, rough machined, or finished machined, including honing. Complete welding and machine shop facilities for fabrication.



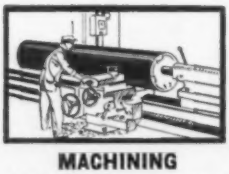
SPINNING

ACIPCO tubes are centrifugally spun to exact physical and metallurgical specifications. Thus, the exact size and metal analysis your process or project requires is assured.



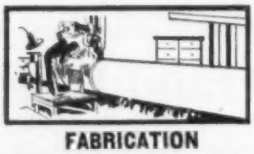
HEAT TREATING

Modern equipment for uniform, controlled heat treating and quenching is an ACIPCO advantage for users of steel tubes where specific physical, mechanical and other metal properties are required.



MACHINING

ACIPCO'S machine shop, one of the South's most completely equipped, performs a full range of machine shop operations including turning, boring, drilling, facing, grinding, metallizing, polishing and honing.



FABRICATION

Complete, integrated facilities for machining, welding, finishing and heat treating of tubular parts save time and expense for ACIPCO customers.



TECHNICAL ASSISTANCE

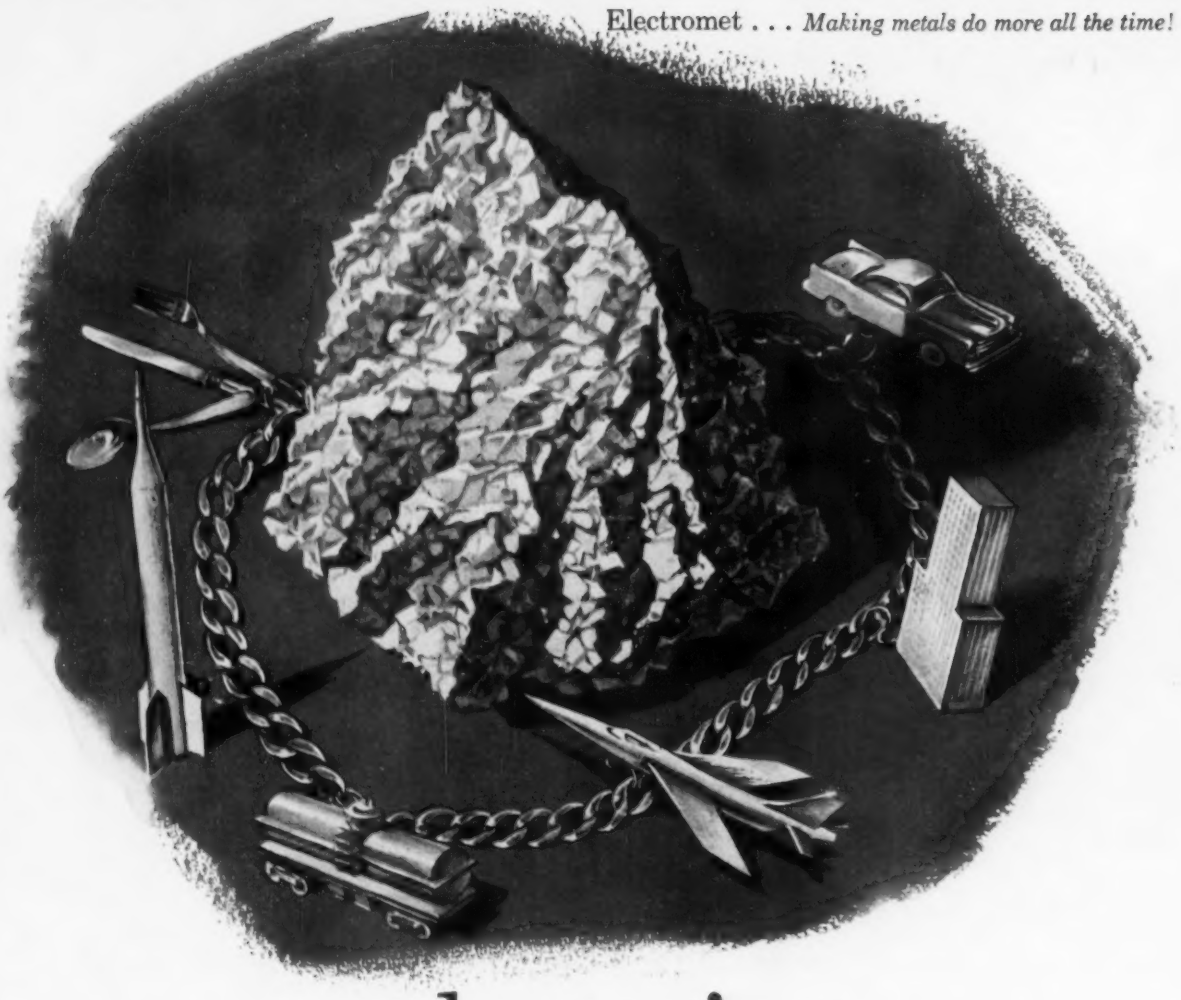
A staff of highly trained engineers, metallurgists, chemists, and craftsmen is available to designers and manufacturers who specify ACIPCO spun tubes.

Special Products Division

AMERICAN CAST IRON PIPE CO.

PHONE AL 1-8121, EXT. 285 • BIRMINGHAM, ALA.

Electromet . . . *Making metals do more all the time!*



What a difference chromium makes!

As the key metal in many of today's steels and alloys, chromium has greatly widened man's engineering horizons. "Super" alloys containing chromium are establishing new thermal limits . . . help jet, missile, and rocket parts withstand temperatures of 2000° F. and higher.

Steels become "stainless" . . . special alloys are exceptionally corrosion resistant . . . engineering steels gain extra wear resistance and strength . . . copper and aluminum are improved—with chromium.

ELECTROMET, the leading producer of chromium, is constantly searching for better ways to produce and use this metal. Chromium metal of the highest purity and ferrochrome with the lowest carbon content commercially available are typical results of ELECTROMET research. Such pioneering achievements lead the way to better steels and more versatile, more useful alloys.

Forty-four grades of chromium are among more than 100 high-quality alloys and metals that ELECTROMET produces. Want to know how chromium and its alloys can help meet your needs? Ask ELECTROMET.

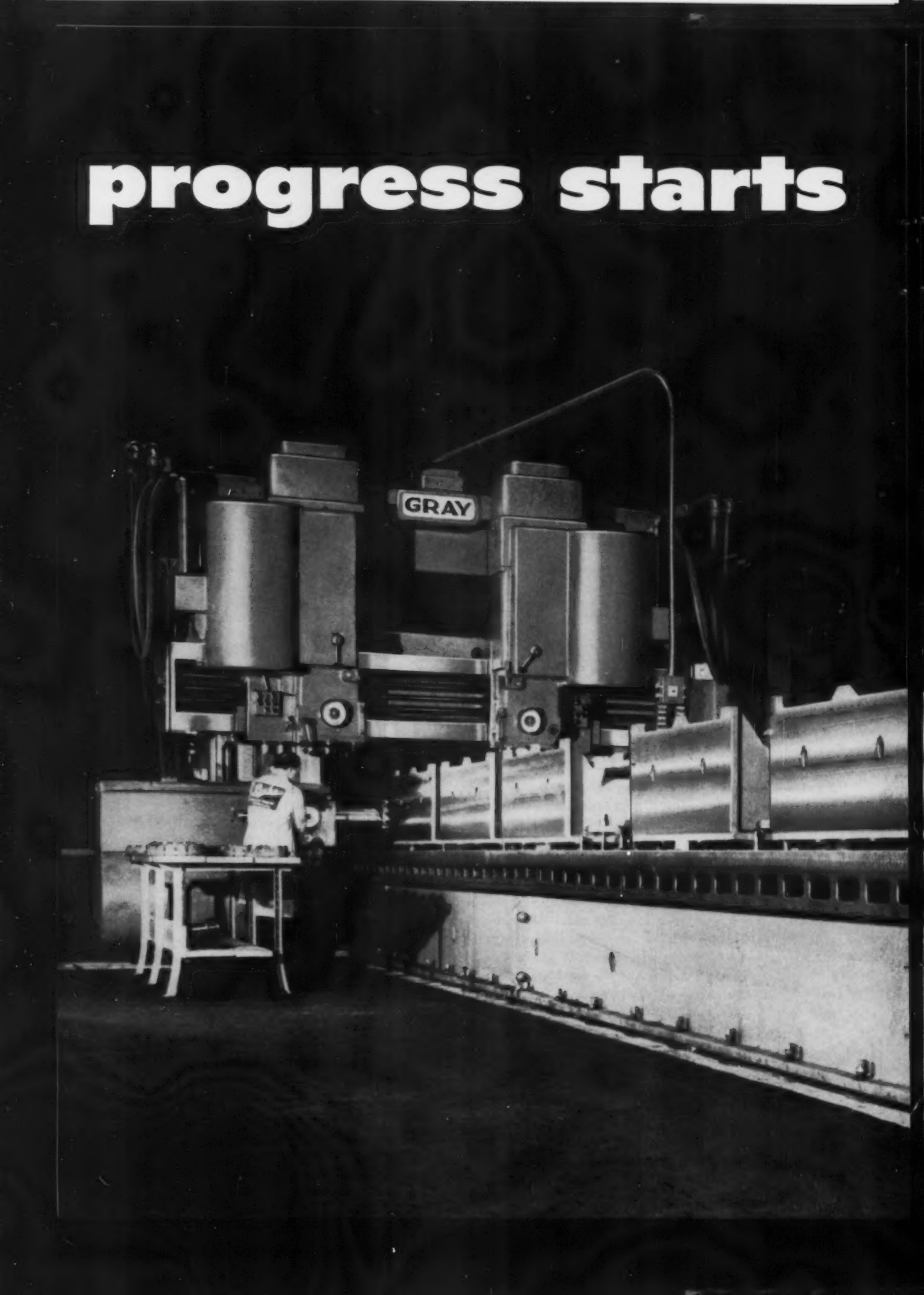
ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

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progress starts

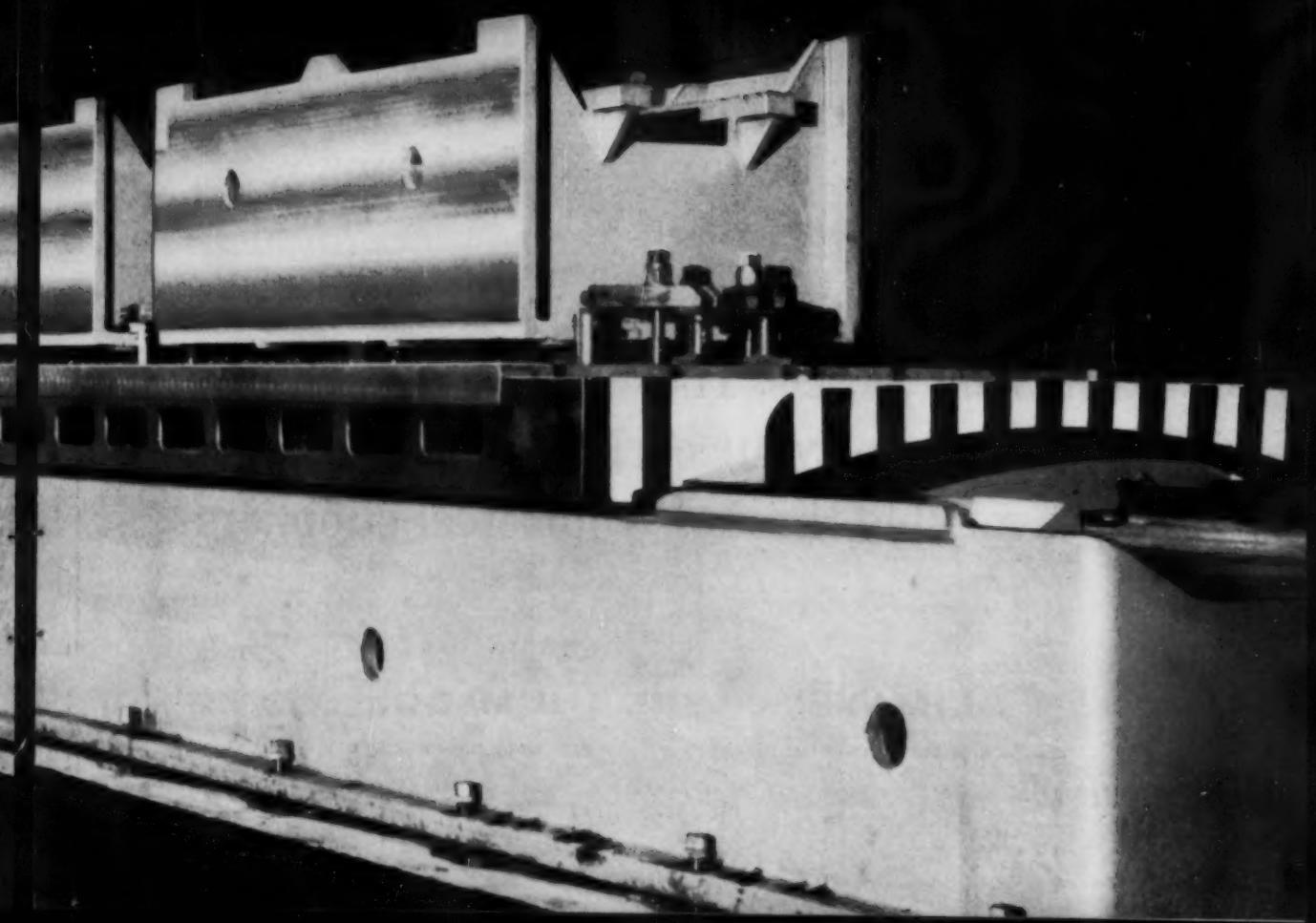


on  a GRAY

What you see being milled on this big 105 foot long Gray, are transfer machine bases of the future... six at a time... automation production machines of Buhr Machine Tool Co., of Ann Arbor, Michigan. It's logical that this company, engaged in producing cost cutting, time saving equipment, should select a cost cutting, time saving Gray todo the job.

Gray unit head planer type millers dominate the field of modern heavy duty milling. This 66" x 66" x 50' giant can simultaneously deliver 300 H. P. to its four cutters. Duplex tables virtually eliminate idle time by permitting work set-up on one section, while work is being milled on the other section. Unusually simple control encourages maximum operator efficiency. All this, plus mirror smooth surfaces milled to precise tolerances maintain the Gray reputation for top quality the world over.

The G. A. GRAY Co., Cincinnati 7, Ohio



NOW!

FIVE MOLY CARBURIZING STEELS ACCEPTED AS STANDARD AISI-SAE GRADES

AISI Number	C	Mn	P Max.	S Max.	Si	Ni	Cr	Mo	Corresponding SAE Number
4422	0.20/0.25	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.35/0.45	4422
4427	0.24/0.29	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.35/0.45	4427
4520	0.18/0.23	0.45/0.65	0.040	0.040	0.20/0.35	—	—	0.45/0.60	4520
4718	0.16/0.21	0.70/0.90	0.040	0.040	0.20/0.35	0.90/1.20	0.35/0.55	0.30/0.40	4718
8822	0.20/0.25	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.30/0.40	8822

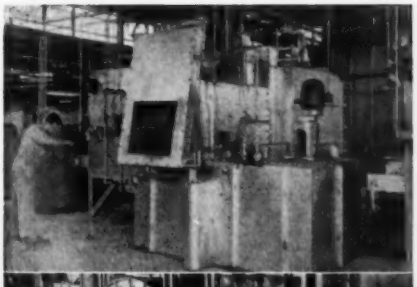
Wide use in automotive transmission and differential ring gears and pinions results in recognition of Molybdenum's economical contribution to case and core hardening in carburizing steels. These economies can be useful in most of your carburizing applications. Now available through your steel suppliers.

CLIMAX MOLYBDENUM CO.

A DIVISION OF AMERICAN METAL CLIMAX, INC. • 500 FIFTH AVENUE, NEW YORK 36, N. Y.

WHEN IT COMES TO HEAT TREATING—
"Do-It-Yourself" can sometimes be costly

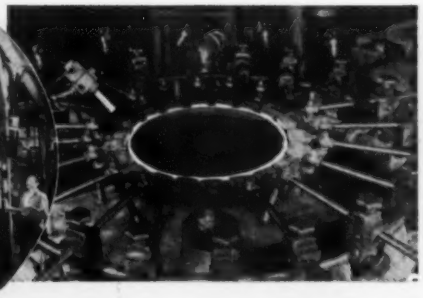
Buying equipment and supplies to perform heat treating operations within your own plant is only one step in many that must be considered when contemplating the installation or expansion of a heat treating department.











Here are some of the factors that should be included when figuring the cost of operating your own heat treating department—of "doing-it-yourself" when it comes to heat treating:

- **Technical skill:** Trained operators whose skill is the result of years of experience are essential
- **Maintenance:** Rapid deterioration of equipment occurs unless there is constant repair, maintenance, and skillful handling of the equipment
- **Quality control:** Testing equipment and skilled operators are necessary to maintain uniformity and quality control of all heat treating operations
- **Sufficient equipment and supplies:** A great variety of equipment is needed to meet the requirements of annealing, brazing, hardening, carburizing, stress relieving, nitriding, and all other heat treating processes; and an endless variety of materials and supplies must be kept on hand.

These problems and many more have been solved by commercial heat treaters. They have the answers because heat treating is their business.

Every MTI commercial heat treater listed here is a specialist with complete service facilities under one roof. Each one has the facilities, equipment, skill and experience which will enable him to meet your most exacting heat treating requirements.

Consult any of these HEAT TREATING SPECIALISTS

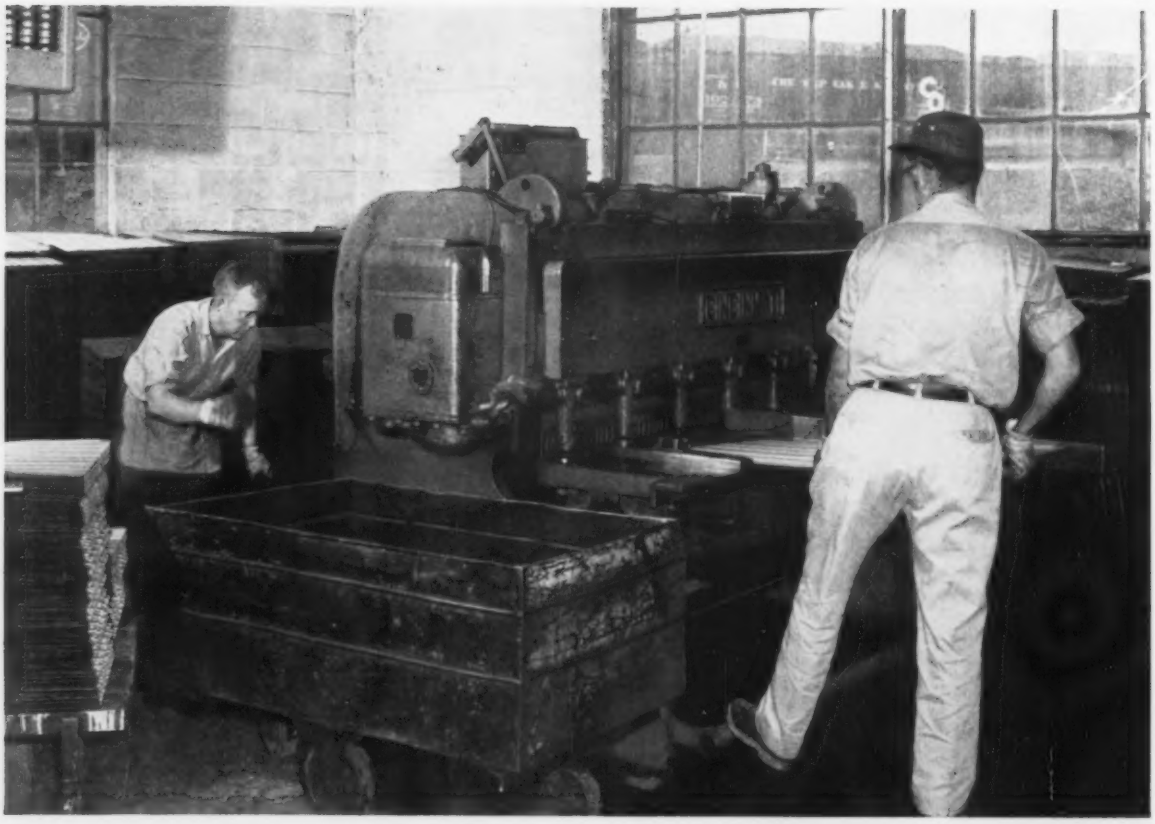
American Metal Treatment Co.
Elizabeth, New Jersey
Anderson Steel Treating Co.
Detroit, Michigan
Benedict-Miller, Inc.
Lyndhurst, New Jersey
Bennett Heat Treating Co., Inc.
Newark 3, New Jersey
Commercial Metal Treating, Inc.
Bridgeport, Connecticut
Cook Heat Treating Co. of Texas
Houston 11, Texas
The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio
Dominy Heat Treating Corp.
Dallas, Texas
Drever Company
Philadelphia 33, Pennsylvania
Greenman Steel Treating Company
Worcester 5, Massachusetts
Fred Heinzelman & Sons
New York 12, New York

MTI
METAL TREATING INSTITUTE

Alfred Heller Heat Treating Co.
New York 38, New York
Hollywood Heat Treating Co.
Los Angeles 38, California
Ipsenlab of Canada, Ltd.
Toronto, Ontario
Ipsenlab of Rockford, Inc.
Rockford, Illinois
L-R Heat Treating Company
Newark, New Jersey
The Lakeside Steel Improvement Co.
Cleveland 14, Ohio
Metallurgical, Inc.
Minneapolis 14, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri

New England Metallurgical Corp.
South Boston 27, Massachusetts
Owego Heat Treat, Inc.
Apalachin, New York
Paulo Products Company
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
Pittsburgh Metal Pressing Co., Inc.
Pittsburgh 15, Pennsylvania
The Queen City Steel Treating Co.
Cincinnati 25, Ohio
J. W. Rex Company
Lansdale, Pennsylvania
Stanley P. Rockwell Company
Hartford 12, Connecticut
Scott & Son, Inc.
Rock Island, Illinois
Syracuse Heat Treating Corp.
Syracuse, New York
Temperature Processing Co.
North Arlington, New Jersey

This advertisement sponsored by these Companies which are members of the Metal Treating Institute



production: 10,000,000 cuts
maintenance cost: $896.00

This Cincinnati Shear has been in constant service for ten years, cutting 18-gauge corrugated sheet, 1010 draw quality, for a prominent heating equipment manufacturer at an average rate of 4000 cuts a day. That adds up to more than a million strokes per year—or 10,000,000 strokes in ten years.

Accuracy has always been excellent. The machine has been "down" *only for blade changes.* Special blades are used in this operation, to eliminate distortion of the corrugations.

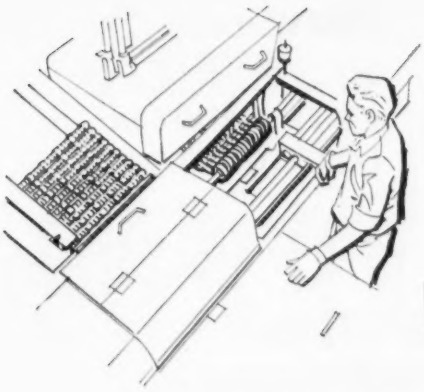
Cost of machine maintenance, including blade resharpening, has been $896.00 for the entire ten years. "This," says their production manager, "to my way of thinking, is very good performance." We agree. Yet this is not exceptional. Every Cincinnati Shear is built to provide this kind of dependability and low maintenance, and we have hundreds of case histories to prove the point.

Specify Cincinnati for all your shear requirements. Write Department B for Catalog S-7R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.



17 Selected Areas Heated to 1650° F. in...

Just 10 Seconds

with TOCCO* *Induction Hardening*



A leading automobile manufacturer uses TOCCO Induction Heating for the tough, precision job of hardening camshafts. Material is high alloy cast iron. Minimum hardness obtained is 57 Rockwell C. Heating time is just 10 seconds per shaft. Production is 360 camshafts per hour. Take a look at these advantages:

1. TOCCO's localized heating means a minimum of distortion—far less than if the entire shaft were heated by other methods.
2. Obviously, the power cost is less than if the entire camshaft were heated.
3. TOCCO's automated process, with precise control, permits far less inspection than conventional methods—far fewer rejects.
4. TOCCO is cleaner and cooler, provides much better working conditions.

Even though you don't manufacture camshafts, look to TOCCO for your tough metal-heating jobs. Hardening, annealing, brazing, soldering, melting, heating for forging or forming—all can be done better, faster and at lower cost with modern, automatic TOCCO Induction Heating.



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Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

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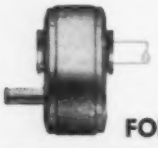
DETACHABLE MOTOR DESIGN
permits motor change in minutes — avoids downtime for motor repairs.

Now - a MOTORIZED SPEED REDUCER FOR MOUNTING DIRECTLY ON SHAFT

the NEW BOSTON Gear® OPTIMOUNT TRADEMARK

IT'S THE NEW OPTIMOUNT

Ratiomotor for shaft mounting. It's the compact power package you have needed to save space without sacrifice of top transmission efficiency. Single or double reduction helical geared units deliver 87.4 to 431 output RPM. Get details—find out how OPTIMOUNT can solve your drive design problems.



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FOR SHAFT-MOUNTING . . .

OR IN STANDARD BASES FOR ANY FLOOR, WALL, OR CEILING MOUNTING POSITION



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OPTIMOUNT delivers maximum power, with highest efficiency, through precision-finished helical gearing made to BOSTON Gear quality standards. Get details from your Distributor. He will demonstrate the many features that assure OPTIMUM PERFORMANCE. Boston Gear Works, 72 Hayward St., Quincy 71, Mass.

66 MODELS
FROM STOCK

680 OPTIONAL MOUNTING ARRANGEMENTS

1/6 to 15 H.P. DRIVES

For nearest Distributor LOOK UNDER "GEARS" in the 'Yellow Pages'

INDUSTRIAL DISTRIBUTION THE MODERN WAY OF PRODUCTION

CALL YOUR BOSTON Gear DISTRIBUTOR

NEW CATALOG OP-1 lists complete OPTIMOUNT data—selection charts, application information.



Remember — STANDARDIZATION PAYS —®

Specify SANDVIK *Precision-Tailored* Spring Steel

FOR ACCURATE FLATNESS, STRAIGHTNESS, WIDTH, GAUGE AND EDGE FINISH *PLUS* SPECIFIC PHYSICAL PROPERTIES



SS-138

When you require specific physical properties combined with accurate dimensions in spring steel, call Sandvik.

From composition, through processing to the finished strip, Sandvik has had long experience in precision-control. That is why you find Sandvik steels used for feeler gauges, watch springs, compressor valves, camera shutters, reeds, shock absorbers and many other exacting spring steel applications.

Sandvik supplies cold rolled specialty strip steels —

- **In special analyses for specific applications.**
- **Precision-rolled thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered — scaleless or polished bright, yellow or blue.**
- **With square, round or dressed edges.**

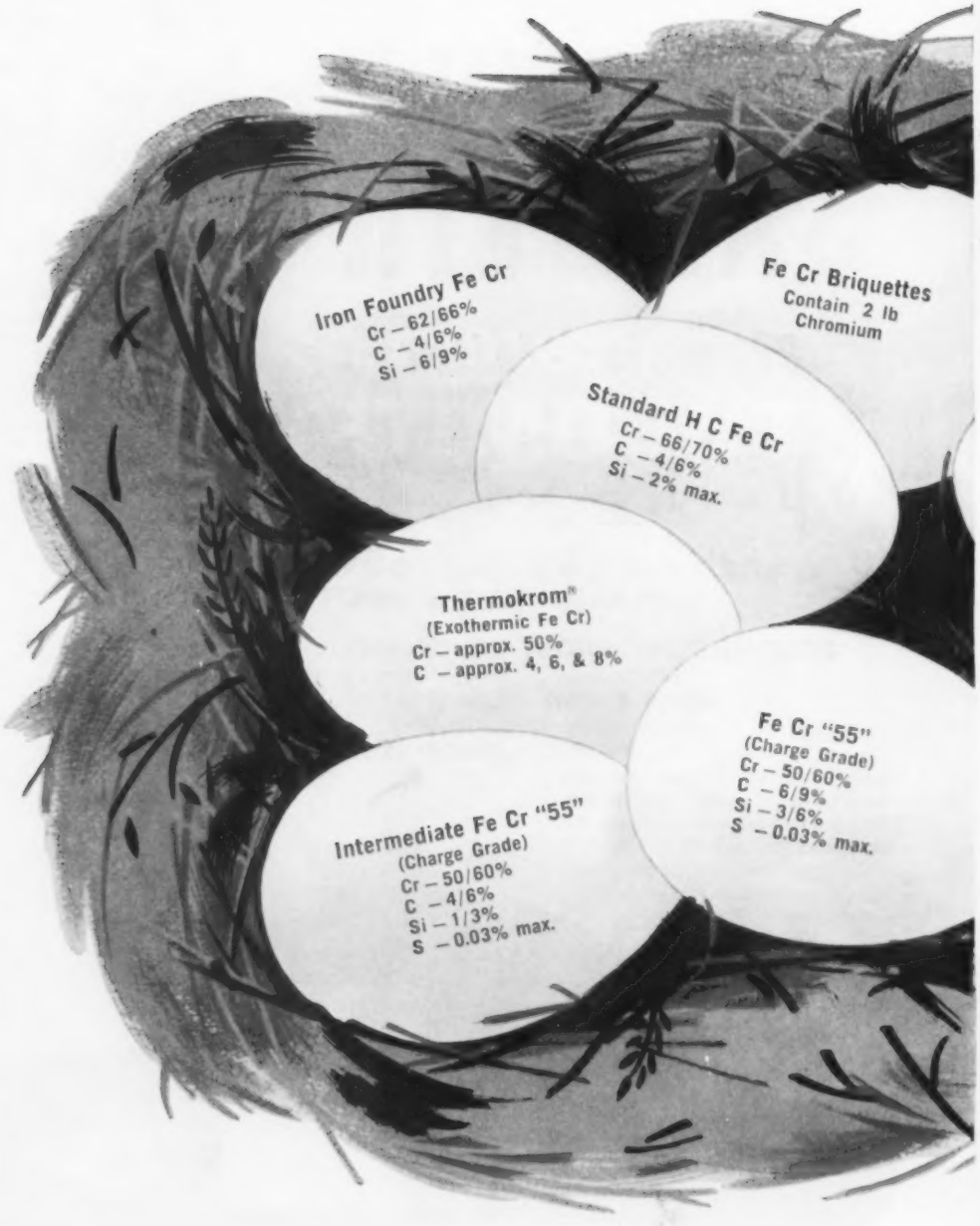
Sandvik stocks a wide variety of qualities and sizes. In addition Sandvik has Rolling, Slitting, Edge-Filing and Hardening and Tempering facilities.

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Gives Specific Data On Sandvik Cold Rolled and Hardened and Tempered Strip Steels. Catalogs leading types by application and lists finish, usual size range and chemistry. Send for your copy today.

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Sandvik Quality Steels



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Here's one case where *getting* all your eggs from one basket pays off! When you meet *all* your chromium alloy requirements from the complete Vancoram line, you keep inventory and ordering problems to a minimum . . . you are *assured* of constant, superior quality . . . and you can count on expert technical advice, no matter what problem crops up in your melt shop.

And here's another plus! Because VCA is fully integrated from mine to finished product, and supplies *every* major chromium alloy, you can count on unbiased recommendations when you need them. What's more, intensive, continuing Vanadium Corporation



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metallurgical research means new, better alloys will come your way. So, whenever it's a question of chromium alloys, always get the best answer – from your VCA representative!

We'll be at the METAL SHOW, Booth No. 446, Cleveland, Ohio, October 27-31. See you there!

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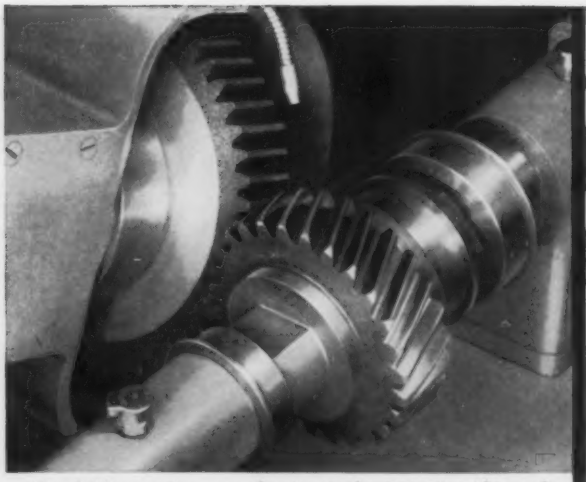
We supply high or low carbon steel wire—round, flat or shaped—in a wide variety of sizes, tempers, grades and finishes — in steel-strapped or paper-wrapped coils; on spools, reels, "spiders" (holding up to a 4000-lb. continuous length of wire) or in fibre drums. Let us know your requirements.

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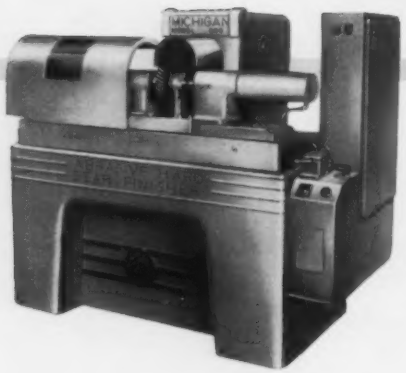
The finishing action—an abrasive tool rotates in tight mesh (and drives) the hardened work gear in a crossed-axes relationship. The table traverses the work the full face width.



Grit content of the abrasive-plastic tool varies with application. Relatively inexpensive, the throwaway tools actually become even more accurate as they "wear in".

Announcing HARD GEAR FINISHING...

...new process removes nicks and surface imperfections after heat treating to give you quiet, smooth-running gears. Uses long-life throwaway tools to slash rejections



Abrasive Hard Gear Finisher (Model 999), a compact, functionally styled machine cleans up and silences hard gears in about one minute. With horizontal axes, the finisher is easily tooled for semi- or full-automatic operation. An integrated gear speeder and/or crowning attachment are optionally available with the machine.

Now you can obtain consistent quietness and smoothness on your hardened small- and medium-sized gears (up to 12-inches diameter). Michigan Tool's Abrasive Hard-Gear Finisher does the job quickly and effectively at low cost. It uses amazingly long-life abrasive-impregnated tools to remove nicks and burrs, improves finish, and tightens dimensional accuracy by further refinement after heat treat. It all adds up to quiet, lower cost gears. Full details in Bulletin 999. Write for it.

MICHIGAN TOOL Company

7171 E. McNICHOLS RD., DETROIT 12, MICH., U.S.A.
IN CANADA: COLONIAL TOOL CO. LTD.



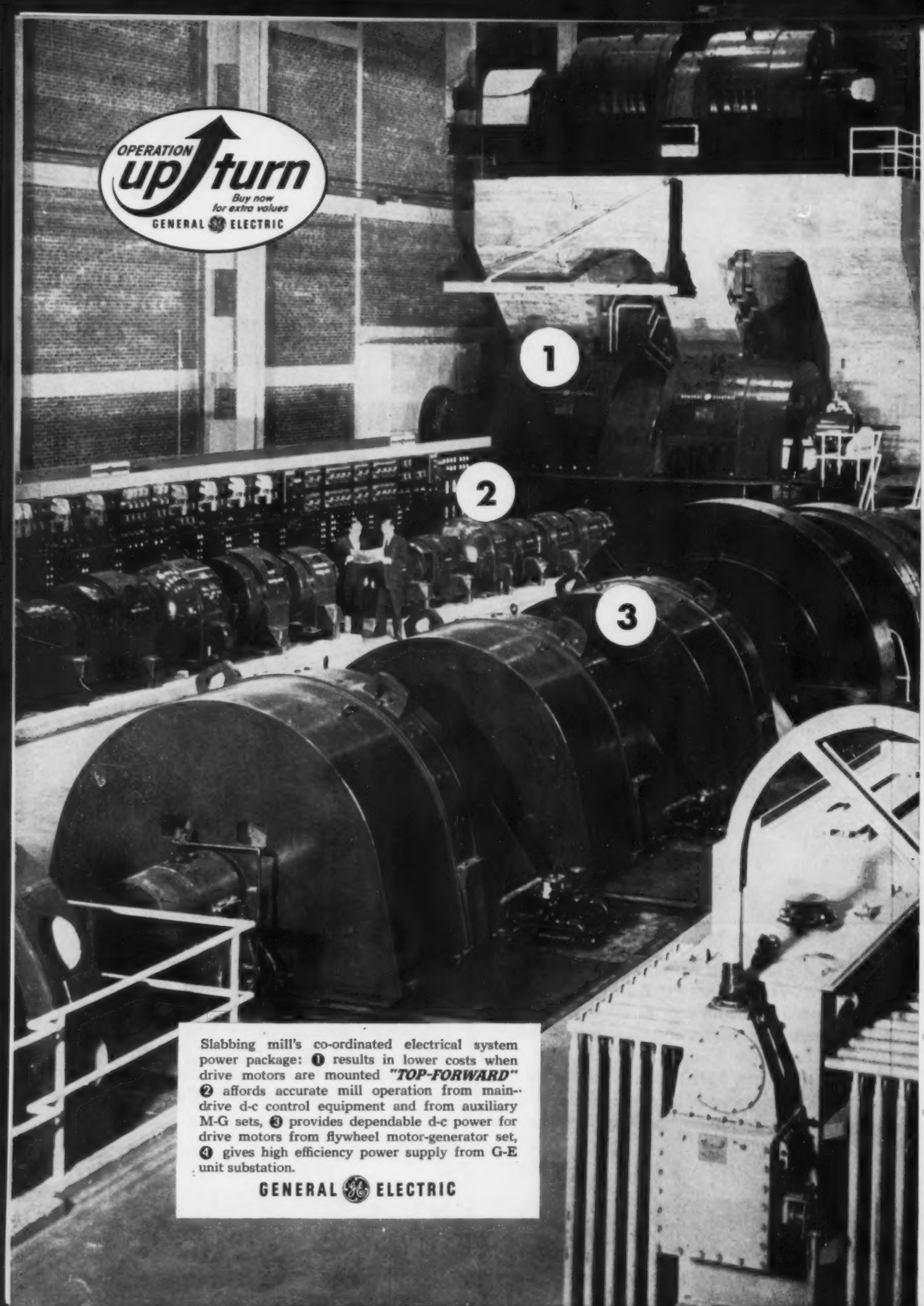
Birth of A 20 Ton Sailor

Looks like any other *seventy-two* inch steel ingot —but is it? Trained down to fighting weight, it is a *twenty* ton sailor aboard an oil tanker . . . a ship's shaft to turn propellers against the heavy seas of the North Atlantic. Its "trainers" . . . experts in forging, heat treating, machining . . . men of long experience in quality control carefully check every step of the way to make sure it holds its "rating" in the ship's company. Steel forgings and castings for naval and maritime fleets are completed here from raw materials to shipping dock . . . have been for over three quarters of a century. Another of the many important reasons you can consult with us on *your* Steel Forging and *your* Steel Casting Components with full confidence.

ERIE FORGE & STEEL CORPORATION

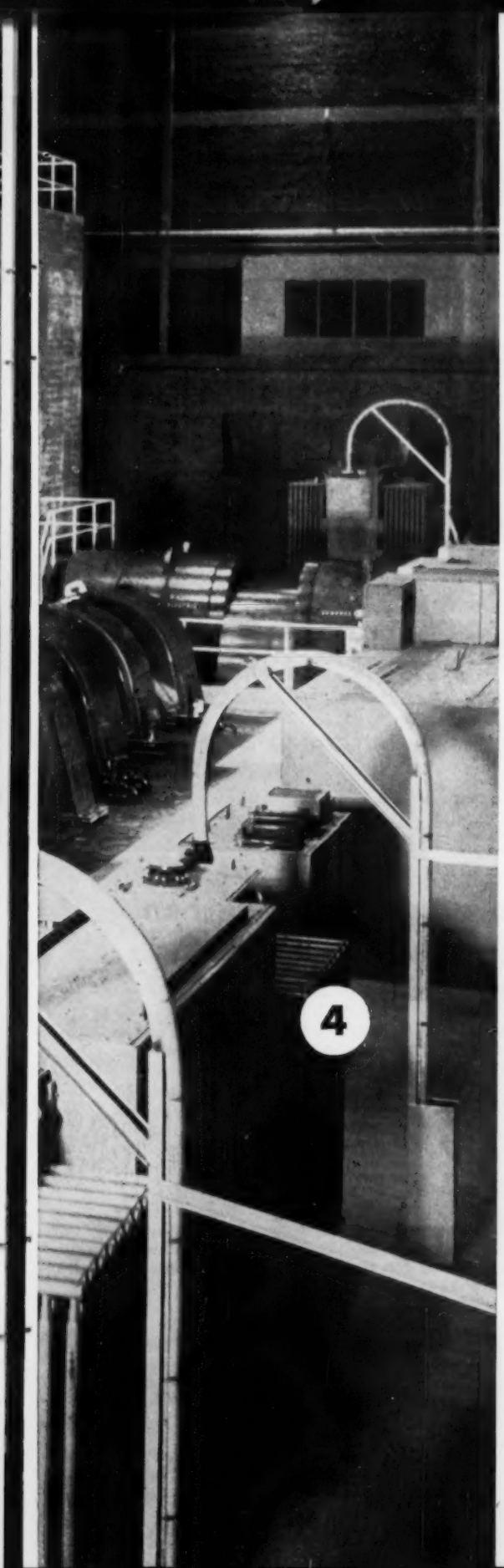
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MEMBER AMERICAN IRON AND STEEL INSTITUTE



Slabbing mill's co-ordinated electrical system power package: ❶ results in lower costs when drive motors are mounted ***"TOP-FORWARD"*** ❷ affords accurate mill operation from main-drive d-c control equipment and from auxiliary M-G sets, ❸ provides dependable d-c power for drive motors from flywheel motor-generator set, ❹ gives high efficiency power supply from G-E unit substation.

GENERAL ELECTRIC



New General Electric Drive System...

Lowers Installation, Maintenance Costs

A new General Electric DC Drive System for reversing mills incorporates unique features designed to save considerable installation and yearly maintenance expense. With the G-E design, large twin drive motors become easily accessible—this means less maintenance expense. And, with ventilating equipment "built-in", foundation and other installation costs are reduced. Modernization of obsolete mills becomes more economical than ever before.

Now in operation at an Eastern mill, the new drive system resulted from an extensive G-E engineering study into previous construction and maintenance procedures. The new ***"TOP-FORWARD"*** arrangement, for example, places the top motor nearest the mill, with the rear motor shaft passing under the forward motor. Result: servicing time is reduced. Design of quick-removable motor covers permits faster servicing, with a minimum of effort.

These revolutionary ***"TOP-FORWARD"*** mill motors with extra value features available now, combine with other electrical system components to give one of the fastest and most accurate drive systems now available to the metal rolling industry.

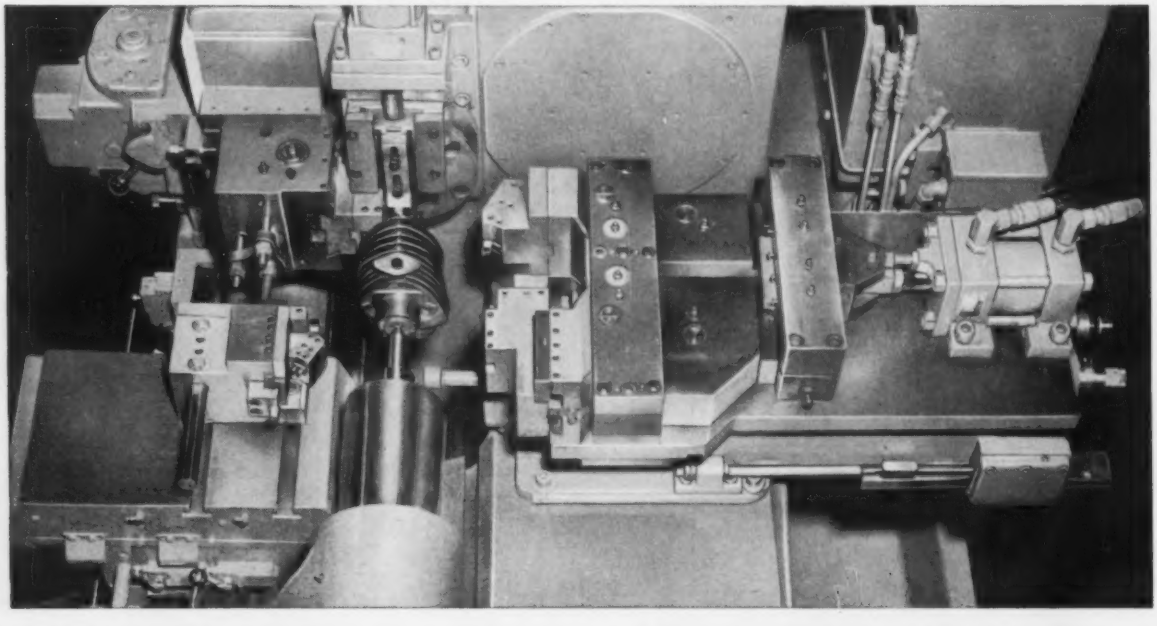
G.E. is ready to work with you to provide the most advanced quality-engineered electrical equipment for your mill applications. Your nearest General Electric Apparatus Sales Office will give you complete information. Write for GEA-6812, DC Drives for Metal Rolling to General Electric Company, Schenectady 5, N. Y. 659-122

Engineered Electrical Systems for Steel Mills

GENERAL ELECTRIC



Six different sizes and types of workpieces are handled easily on this job. Extra expanding mandrel and sleeves at right are for different sizes.



How Harley-Davidson speeds motorcycle part production

Machines both ends in single chucking, using Gisholt No. 12 Automatic to get maximum accuracy, cut production costs

This well-planned setup reveals how Harley-Davidson Motor Co., Milwaukee, Wis., is handling cast iron front and rear cylinders.

Smart tooling on a Gisholt MASTERLINE No. 12 Automatic Production Lathe handles 6 different sizes and types of workpieces. Change-over is fast and easy. A special headstock-mounted, air-operated locating stop speeds work handling.

While tools in the front carriage turn and chamfer at one end of the piece, tools in a headstock-mounted auxiliary slide chamfer the I.D. on the other side. Simultaneously, tools on the rear slide face both ends for length. At the end of the cut, tool blocks on the rear independent slide swing open automatically to provide tool relief before withdrawal. Floor-to-floor time on the part shown is 1.2 minutes, only 1.8 to 3.6 minutes for the other 5 workpiece types and sizes.

The new Gisholt MASTERLINE No. 12 Automatic Production Lathe is designed specifically for high production operations; yet, it is flexible enough to handle a variety of similar parts in small repeat lots. The automatic cycle frees the operator to handle other machines or do other work.

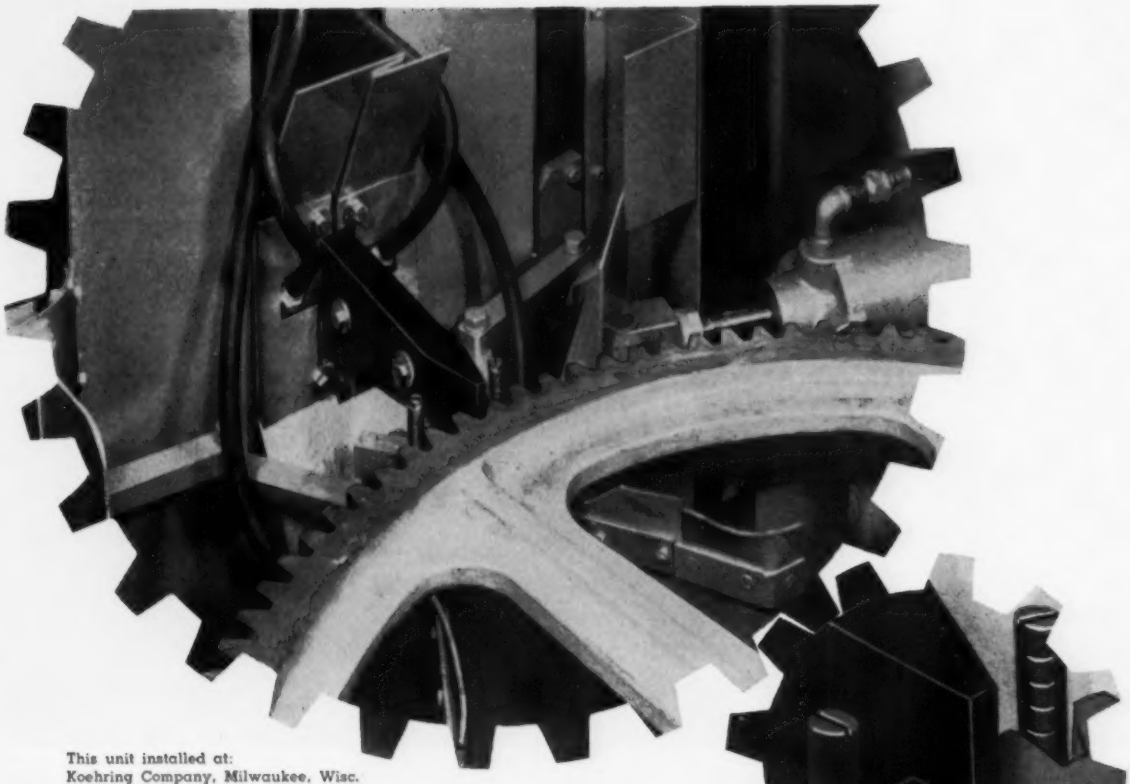
Make a note to phone your Gisholt Representative today. Ask him to come in and show you where the fast automatic cycle and flexibility of the No. 12 Automatic Production Lathe can cut your floor-to-floor time and reduce your costs.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY

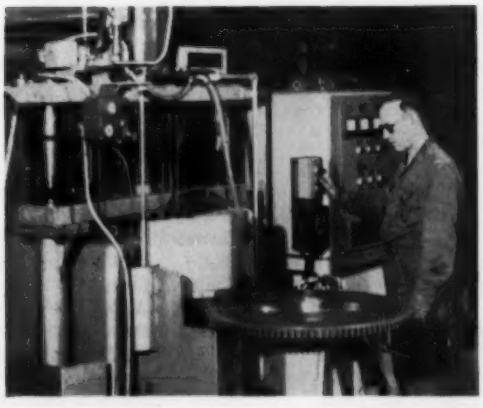
Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE No. 12 Automatic Production Lathe. Ask for Form 1178.



This unit installed at:
Koehring Company, Milwaukee, Wisc.

CONSISTENT RESULTS IN GEAR HARDENING DAY AFTER DAY WITH MAGNETHERMIC INDUCTION HEATING



Magnethermic tooth-by-tooth Gear Hardener produces a product superior to any gear produced by other heat treat methods. The secret—hardening the root as well as the contact surfaces. This method increases the tooth strength at little increase in gear cost.

In some cases, customers have been able to reduce gear size and cost because of added gear strength resulting from the Magnethermic hardening process.

The Magnethermic unit is easily integrated into production flow. The automation advantages of induction heating minimize the training of operating personnel. Users are able to get extremely consistent results from day to day.

MAGNETHERMIC®
CORPORATION
3990 SIMON RD. • YOUNGSTOWN 7, OHIO

Engineering Idea Leadership in Induction Heating
60 to 450,000 Cycles



Twelve different types of frames for one automaker alone are fabricated from Pittsburgh Steel Company sheet in the Detroit Division of Dana Corporation. Here completed frames are moving to the paint shop.

Pittsburgh Steel sheet helps auto designers improve cars



Steel strip begins to look like the side-rail of an automobile frame. This big forming press forms the blank into half a side-rail section.

Improvements In Frames Demand Better And Better Steel

Formability of sheet steel is speeding production for a large manufacturer of auto frames.

At Dana Corporation's Detroit Division, where as many as 4,000 frames can be made in a single day, a unique forming operation has been developed which requires a high degree of this quality called formability.

Known as edgewise bending, the operation would be impossible without hot rolled sheet steel of top quality—like that supplied Dana Corporation by Pittsburgh Steel Company. Because sheet from Pittsburgh Steel has great formability it undergoes severe deformation without rippling, tearing or peeling.

This kind of formability is important to sheet users every-

where who process steel into finished products.

At Dana, cut lengths of sheet are sheared into strips which measure approximately 205 inches long for one standard type of auto frame. These blanks move through a specially-designed edgewise bending machine which holds each strip perfectly flat while pushing part of the strip against one edge. At the same time that two sections of the strip are being pushed edgewise a total of 13 inches, the remainder of the strip is held motionless and straight.

• **Kick-ups in Frames.** The result is two curved sections, one near each end of the strip. These curves give the finished frame the "kick-ups" over the wheels which allow modern cars to hug the road.

Edgewise bending replaced a process which required taking a much larger piece of steel and cutting out the desired curved shape, cookie-cutter fashion, with a high scrap yield.

Only the best sheet steel will take edgewise bending with the steel flowing smoothly into new shapes. That happens when steelmakers achieve just the right degree of formability while keeping steel's inherent toughness.

Consider what has happened in the making of auto frames alone to see how the automotive industry's demands resulted in better sheet steel.

Only five years ago, one of the best known makes of cars had only three standard frames. Now it has twelve. In the intervening years, frames have become 50 percent stronger. They're now made with more severe bends. They're wider and made of steel 40 percent thicker on the average. "Kick-ups" have become higher and higher.

• **Rigid Specifications.** Specifications for physical characteristics and grain structure became more rigid as frames underwent an increasing amount of shearing, punching, die and press work and welding.

Ever since Pittsburgh Steel Company entered the sheet market, its hot and cold rolled sheet has kept pace with the demands for steel that could take more and more deformation.

Whatever your use for sheet, you can benefit from the skilled know-how that has constantly improved the quality of Pittsburgh Steel sheet.

You'll benefit from increased formability that gives you faster, smoother production with fewer rejects. You'll gain, too, from steel of increased toughness. Start benefiting today by calling the nearest Pittsburgh Steel Company district sales office.



Edgewise bending of sheet steel strips is a unique operation at Dana. This machine pushes each strip into a curved section by holding part of it firm while pushing against the edges of other sections.



After edgewise bending, the steel strips are curved at each end. These curves will provide the "kick-ups" which are necessary for extra room over each wheel.

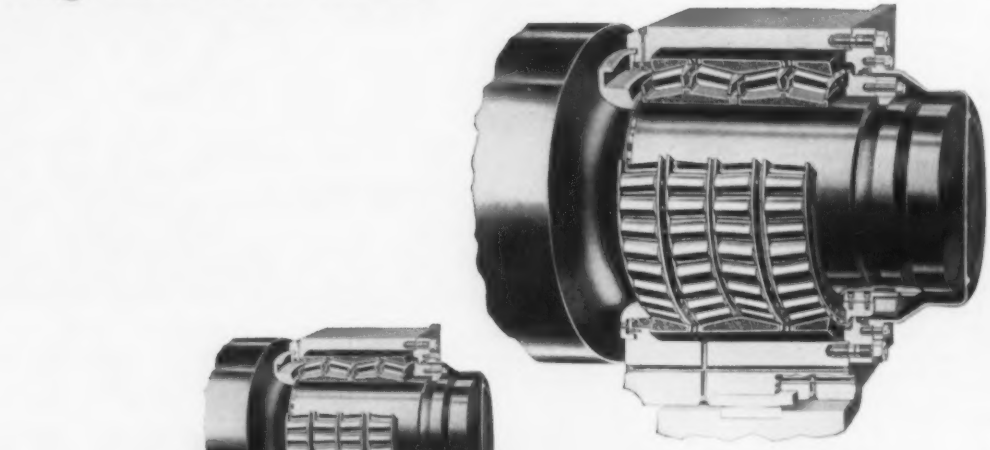
Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

TIMKEN® bearings used on rolling mill roll necks



1933
45 mills

1950
317 mills

1958
1,008 mills

Look how this idea has grown in 25 years!

JUST 25 years ago—in 1933—there were 45 mills using Timken bearing-equipped stands. Today, 2,436 Timken bearing-equipped stands are used in 1,008 mills . . . more than 22 times as many mills as in 1933.

Why has the idea of using Timken® tapered roller bearings on mill roll necks become so widely adopted? For all these reasons:

1. LOW BEARING COST. Tonnage records indicate that the long life of Timken roll neck bearings keeps bearing costs per ton of steel rolled to a minimum.

2. GREATER MILL RIGIDITY. Balanced proportion design of Timken bearings permits larger roll necks than ever before possible with tapered roller bearings.

3. ELIMINATION OF COMPLICATED LUBRICATING SYSTEMS. Timken bearings permit use of simple grease lubrication.

4. LOAD RATINGS INCREASED UP TO 40% due to Timken bearings' balanced proportion design.

5. NO SPECIAL THRUST BEARINGS NEEDED. Timken tapered roller bearings take both radial and thrust loads.

6. MILLS CAN BE STOPPED AND RESTARTED WITH NO LOSS OF STEEL. Timken bearings permit starting under full load.

7. HIGHER ROLLING MILL SPEEDS are possible because Timken bearings minimize friction.

8. PROLONGED ROLL LIFE is assured because Timken bearings provide maximum roll neck strength, less wear.

You can be sure of all these advantages in either existing or new equipment by specifying Timken tapered roller bearings for back-up and work rolls. Consult our roll neck bearing specialists for full details. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.

TIMKEN TRADE-MARK REG. U. S. PAT. OFF.

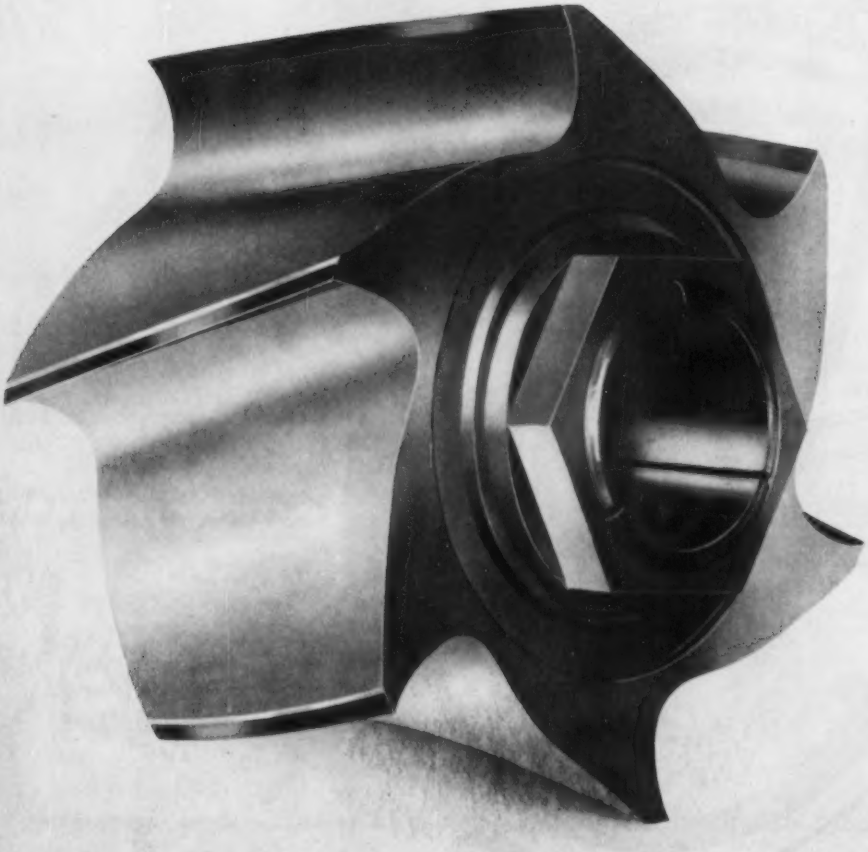
TAPERED ROLLER BEARINGS ROLL THE LOAD

NOW: Higher strength costs you less! Specify TENZALOY*, the self-aging aluminum alloy that needs no heat treatment! TENZALOY is a corrosion resistant aluminum alloy that ages at room temperatures, gives high strength properties superior to those normally obtained only by solution treating, quenching and artificial aging. And these properties are stable, proved by conclusive test data taken over a ten year period. No special foundry techniques are required. No fluxes. Castability is excellent with sand cast and plaster molds, and many permanent molds. TENZALOY will not "grow". It takes a brilliant polish and anodizes clear white. Write for TENZALOY Bulletin No. 103 or call one of Federated's 22 sales offices. Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF

ASARCO

AMERICAN SMELTING AND REFINING COMPANY



**TENZALOY is one of a complete range of Federated aluminum casting alloys. These and hundreds of other quality controlled non-ferrous metal products are produced in the 11 plants of the Federated Metals Division.*

Columbia produces 250 bicycle forks per hour with automatic GAS brazing



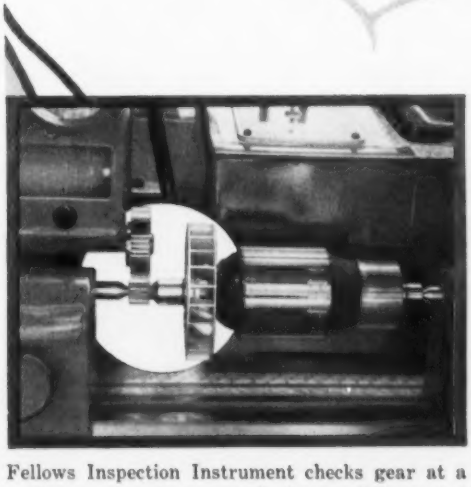
Gas brazing is not new to Westfield, where Columbia bicycle frames have been brazed with Gas-fired Selas processing equipment for many years. During this time, pre-placing of brass filler material and automatic heating have limited dependence on operator skill, reduced material waste, and eliminated costly cleanup operations. With the installation of the new Gas brazing machine in their production operation, these advantages have been extended to include fork manufacture, also.

For information on how Gas equipment can help you in your production operations, call your Gas Company's industrial specialist. He'll be glad to discuss the economies and outstanding results you'll get with Gas and modern Gas equipment. *American Gas Association.*

Two fork styles in all standard bicycle sizes are joined from eight steel components on this new automatic Selas machine by Westfield Manufacturing Co., Westfield, Mass. Controlled combustion and flame geometry bring the parts to brazing temperature of 1750°F in only 86 seconds, using economical Gas equipment.



GEARED to give lightweights heavyweight power!



Fellows Inspection Instrument checks gear at a major gear-motor manufacturer. Integrated Fellows production and inspection equipment assures dependable quality control.

Power used to mean *weight*, too, but not any more; modern gear-motors pack immense power in a small volume, deliver maximum output per pound. Light executive aircraft use powered accessories only large planes could carry ten years ago. Products as diverse as home appliances and machine tools have grown steadily more powerful while shrinking in size and weight.

Accurate, dependable gears produced on Fellows equipment are essential to the performance of many of these mighty midgets. Their operation must be relatively smooth and quiet, even with the high reduction ratios required in many of them. Here, as in many other applications, Fellows Gear Shapers combine accuracy with production speed and low unit cost.

Your own gear production needs, from 1/16" to 120" pitch diameter, can probably be met more efficiently and profitably with Fellows equipment. For full information, get in touch with any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices:
1048 North Woodward Avenue, Royal Oak, Mich.
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

THE PRECISION LINE

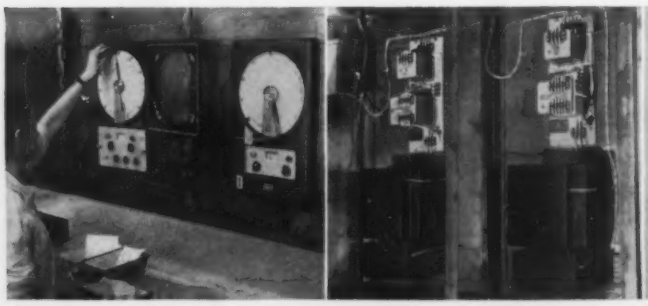
Fellows *Gear Production Equipment*



Fansteel Metallurgical Corp.: Operator loads sintering furnace with trays of FASTELL® heavy duty electrical contacts.

Critical sintering temperatures a problem?

Not at Fansteel Metallurgical Corp., where Speedomax® H is regulating moly heaters and simplifying control of critical sintering temperatures. With temperature dependent upon load density and compact composition, Fansteel depends upon experience for the right temperature . . . upon Speedomax H for control reproducibility. Rugged, compact and completely reliable, this controller continuously regulates power input to moly heaters . . . holds furnace temperature well within specified limits. Speedomax H is providing the same dependable control on numerous heat treat processes . . . is helping produce both process economies and a quality product. *Whatever your heat treat, it'll pay you to investigate Speedomax H!* For details, contact your nearest L&N office or write 4956 Stenton Ave., Phila. 44, Pa.

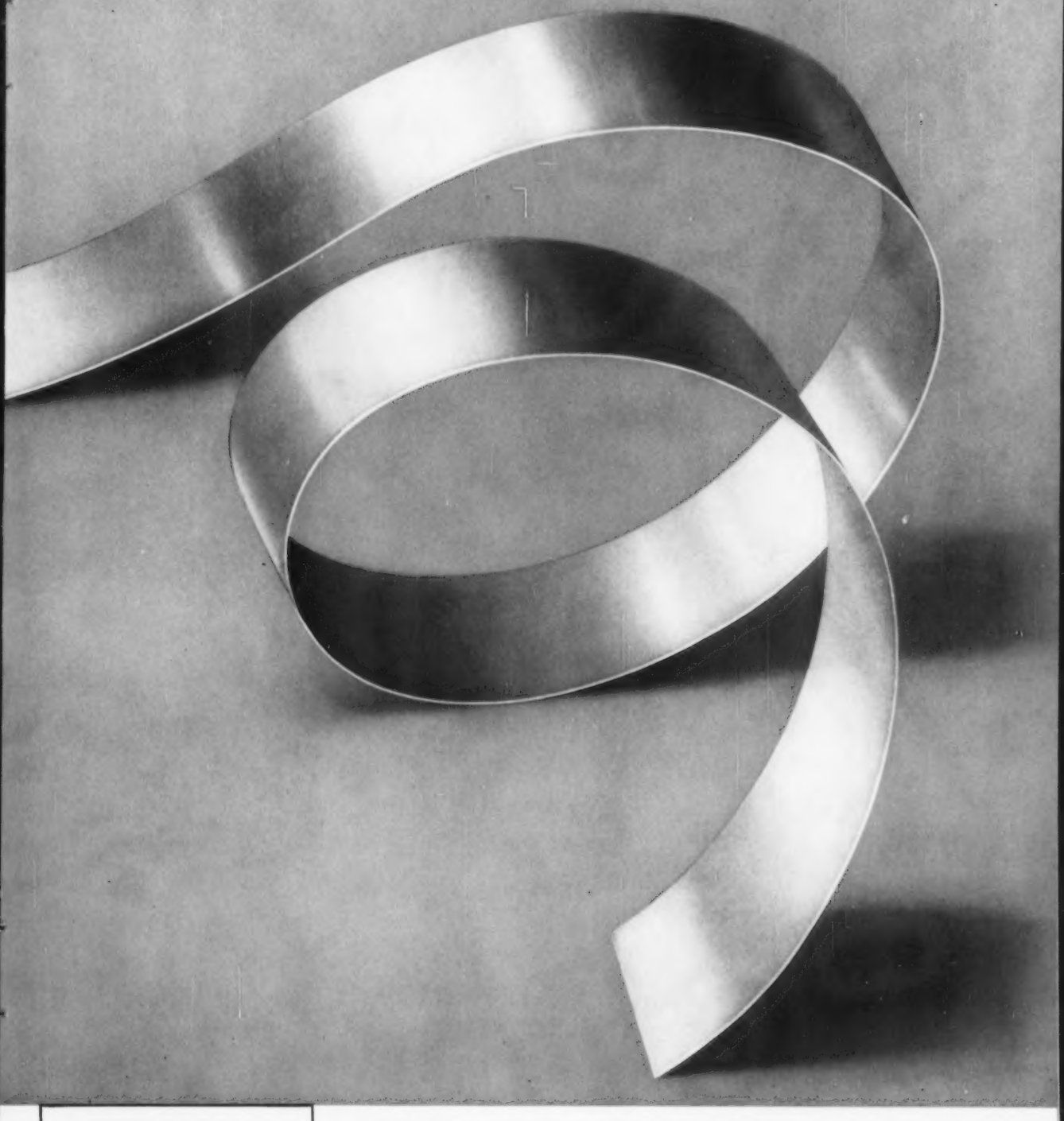


LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces

"H" C.A.T. control brings furnace from 900 to 1300 C in 16 minutes without overshoot or hunting. Magnetic amplifiers are conveniently mounted on panel back.

stainless strip—as you like it

Are your requirements for quality and finish in stainless strip being met? As Crucible makes it, it's rolled to your precise specifications—and produced with a finish that is truly lustrous. Not only that, Crucible ensures uniform metallurgical quality by methodically checking each heat—and makes certain of uniform gauge with electronic measuring controls on the most modern rolling equipment. Next time you need stainless, consider Crucible—a major producer of stainless in all gauges down to .010" and in all widths. Write to *Crucible Steel Company of America, Dept. S115, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

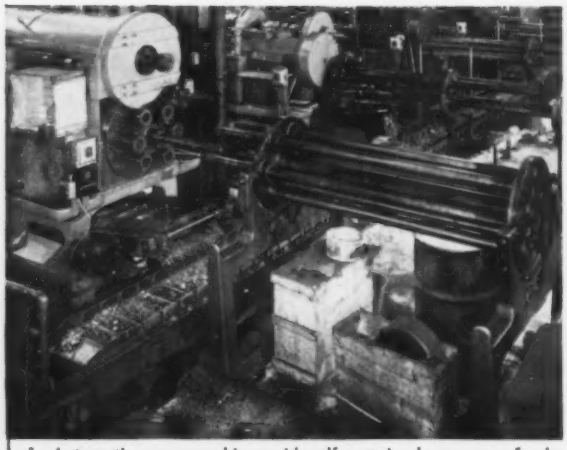


CRUCIBLE STEEL COMPANY OF AMERICA

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

How to Make Chip Handling a Profitable Operation

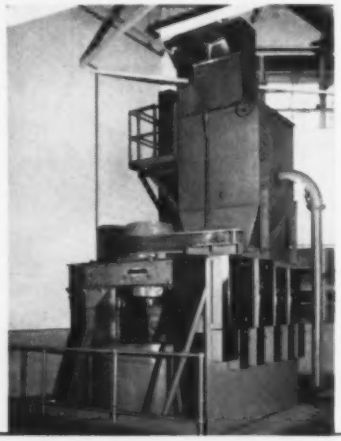
with National Metal Chip Handling and Oil Reclamation Systems



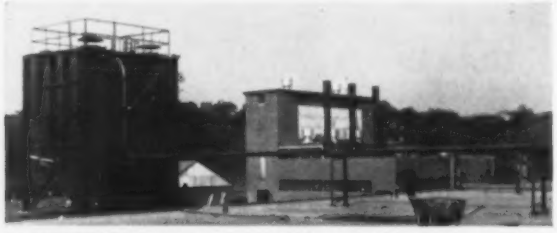
1. Automatic screw machines with self-contained conveyors feeding National apron conveyor. Note: Conveyors can be installed in trenches or above the floor as shown.



2. National inclined apron conveyor feeding work separator which removes bar ends and finished parts from the turnings before delivery of material to the crusher.



3. Oil and chips are separated in the continuous wringer. Oil is reclaimed and chips discharged to storage.



4. National Pneumatic System discharges chips to storage bins. Selector valve and branch line allows segregation of 2 classes of chips. Chip storage bin has a carload capacity and loads car in 20 minutes.

A National system may give you your biggest single cut in costs! Here are quotes from our mail: "Saving $300 daily in scrap handling cost alone!" . . . "Saved $15,850 in 3 months on reclaimed oil!" . . . "$40,000 scrap disposal unit paid off in one year!"

These savings are reported by companies in various types of industry, such as Ford, General Motors, Fafnir Bearing Co., Standard Pressed Steel Co., Chicago Pneumatic Tool Co., Fairfield Mfg. Co., Otis Elevator, and General Smelting Co.

National makes equipment to handle all forms of metal chips and borings . . . steel, stainless steel, cast iron, aluminum, brass or copper. Special equipment has been designed to solve almost every problem in the handling of scrap metals and cutting oils from the large production plant to the job shop operation with a single or group of machine tools.

National Systems are also used for the removal of punch press scrap and the handling of small parts such as cartridge cases, bearing cages, etc.

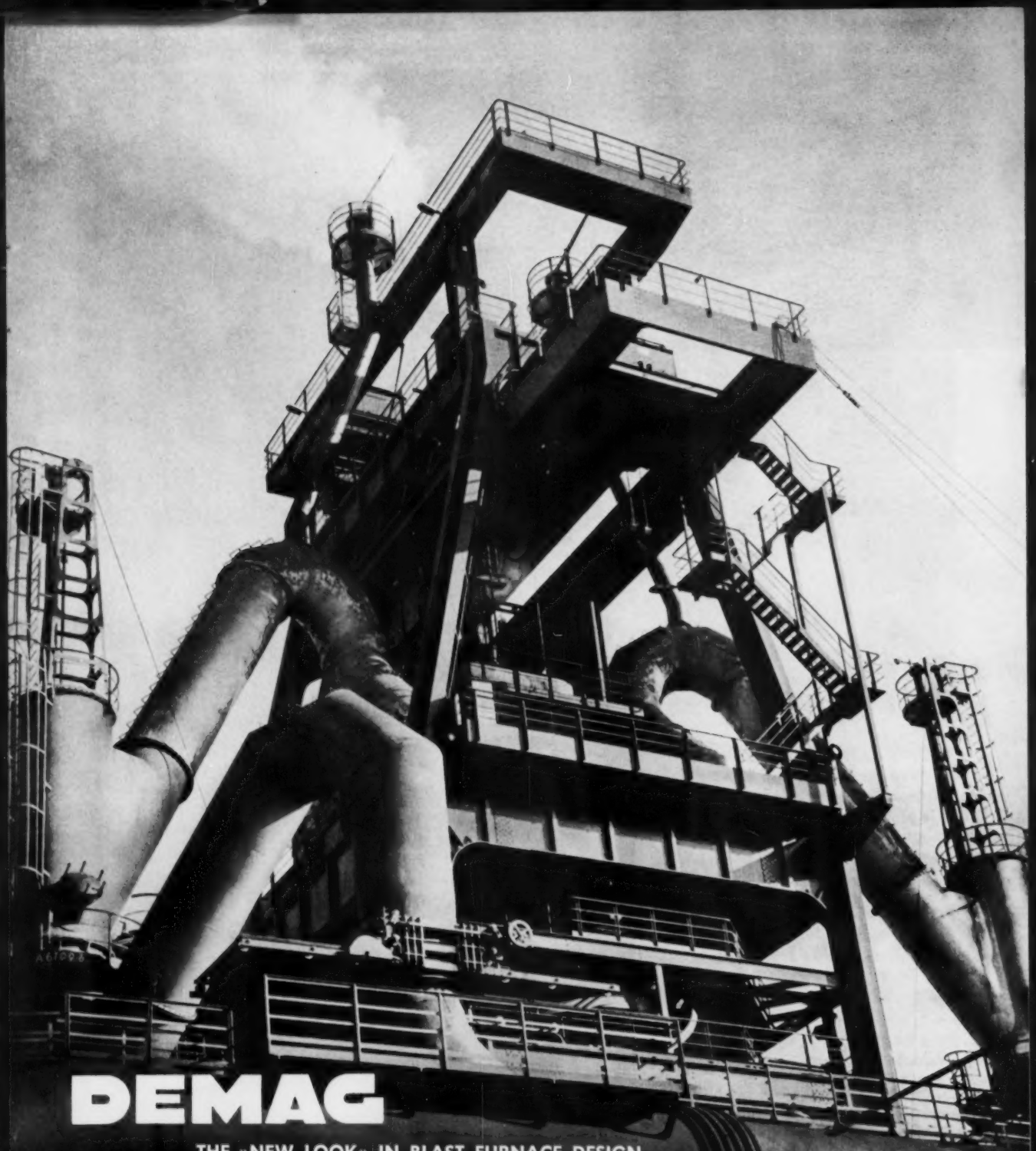
Send for National's free Bulletin C-56 today . . . consult our catalog in Sweet's Mcchine Tool Catalog File . . . or contact our nearest representative.

National
CONVEYORS
COMPANY INC.
FAIRVIEW, BERGEN COUNTY, N. J.
WHitney 5-9136

Also manufacturers of **Ash Conveyor Systems** (Send for Bulletins P57-A and H57) and **Pneumatic Systems** for handling granular materials (Bulletin P-58G)

REPRESENTATIVES

ATLANTA 3, Ga. — P. H. Nichols & Co. — 603 Whitehead Bldg. • **BALTIMORE 18, Md.** — Lamb Engineering Co. — 2125 Maryland Ave. • **BOSTON 94, Mass.** — Mills Engineering Co., Inc. — 300 First Ave., Needham Hts. • **BUFFALO 2, N. Y.** — Charles P. Hague, Inc. — 625 Delaware Ave., Rm. 202 • **CHARLOTTE 7, N. C.** — E. L. Mountcastle — 2617 Selwyn Ave. • **CHICAGO 4, Ill.** — Burke & Colston (Ash) — 53 W. Jackson Blvd. • **CHICAGO 5, Ill.** — Mayer & Oswald (Chip) — 407 S. Dearborn St. • **CINCINNATI 27, Ohio** — Smith E. Hughes — 3716 Petoskey Ave. • **CLEVELAND (Lakewood 7), Ohio** — J. Harry Haywood — 12031 Edgewater Dr. • **DETROIT (Ferndale 20), Mich.** — Beltaire-Drissen — 570 Livernois Ave. • **HARTFORD, Conn.** — Dee Engineering Co. — Cromwell, Conn. • **HOUSTON 5, Texas** — Industrial Handling Engineers — 1200 Bissonnet • **KANSAS CITY 12, Mo.** — W. C. Carolan Inc. — 612 W. 47th St. • **LOS ANGELES 13, Calif.** — W. F. Huff and Co. — 417 S. Hill St. • **PHILADELPHIA, Pa.** — C. V. McQuary — P.O. Box 52, Cheltenham, Pa. • **PITTSBURGH 22, Pa.** — McQuiston and Gibson — Renshaw Building • **ST. LOUIS 22, Mo.** — Medor, Inc. — 10408 Manchester Ave.



DEMAG

THE »NEW LOOK« IN BLAST FURNACE DESIGN

Blast furnace plant of a west-German integrated iron and steel works, comprising two skip-charged blast furnaces built by DEMAG, with frame and inclined hoist of welded plate and a self-supporting furnace shell. Daily capacity 500 tons.

U. S. Representatives:
AMERICAN DEMAG CORPORATION, one Gateway Center, Pittsburgh 22, Pa.

DEMAG AKTIENGESELLSCHAFT DUISBURG GERMANY



At the Rapistan plant,
Youngstown Cold-Finished Steel Bars are fabricated into axles for roller conveyor units and assembled into finished Rapistan table sections.

Accent on Excellence

Youngstown cold-finished steel bars



Without highly efficient gravity conveyor systems—such as this Rapistan Gravity Wheel installation—to provide economical material handling, modern manufacturing plants would find their costs getting out of line—profits shrinking.

In producing their rugged conveyors, Rapids-Standard Company, Inc., of Grand Rapids, Michigan, use and rely on Youngstown's Hot-Rolled and Cold-Finished Bars, Hot and Cold-Rolled Sheets as well as Standard Pipe as an aid in keeping their product quality at the highest level.

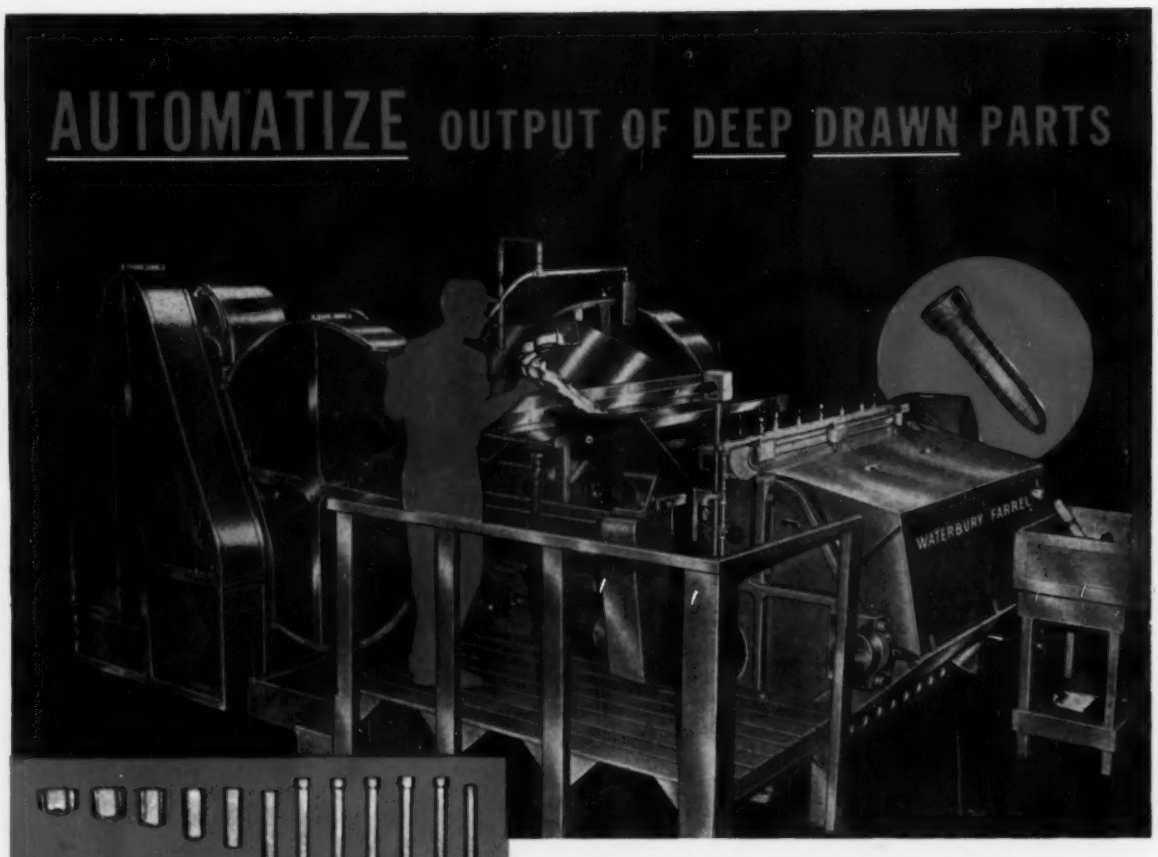
Wherever steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence".

QUALITY YOUNGSTOWN SERVICE

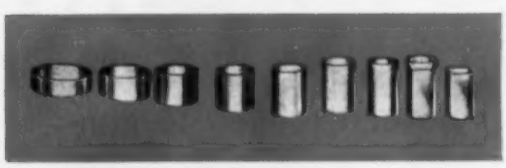
THE
YOUNGSTOWN
SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel, Youngstown, Ohio

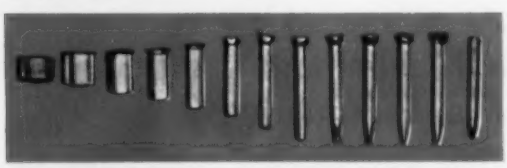
AUTOMATIZE OUTPUT OF DEEP DRAWN PARTS



Knife handle made from .047 thick German silver on a #7-11 station machine. Length of shell, 4⅛"; Dia., ⅜"; production, 2280 pieces per hour.



1¾6" sq. x 2½" long condenser can be made from .018" thick zinc on a #5-9 station machine. Production, 3600 cans per hour.



Ball point pen holder made from .014" thick brass on a #4-12 station machine. Part measures ⅛" Dia. x 3¾" long. Production, 4200 parts per hour.

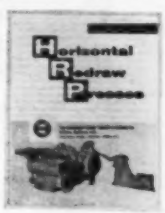
Use WATERBURY FARREL Horizontal Redraw Presses For Low Cost, Mass Production

Continuous, progressive drawing on these multiple station presses automatizes the production of square, round, elliptical, straight or shouldered, deep drawn shells. And, the machine will perform such consecutive operations as drawing, bottom piercing, curling, fluting, clipping and other work.

No longer is it necessary to form these shells on single purpose presses, in separate operations requiring intermediate annealing and handling. Work progresses smoothly, continuously and automatically through these Horizontal Redraw Presses.

For automation in feeding material, Waterbury Farrel can supply (1) a cupping attachment for single machines to permit feeding strip stock, or, (2) a cupping press with gang tooling and a conveyor system for supplying cups to a bank of machines.

Write today for your free copy of CIRCULAR 926-M describing these machines and the wide range of sizes available.

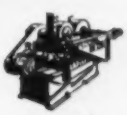


The WATERBURY FARREL FOUNDRY & MACHINE CO.
WATERBURY, CONN.

DIVISION OF TEXTRON INC

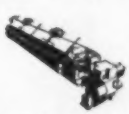
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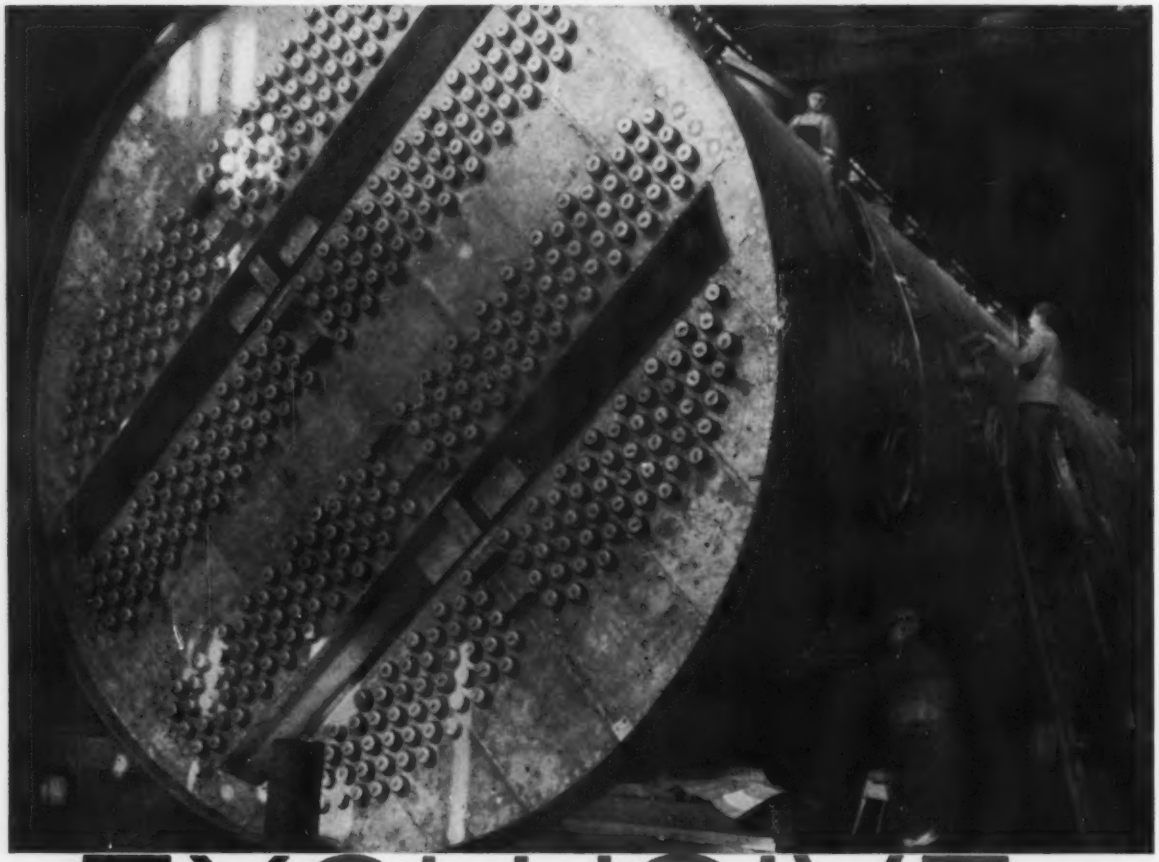

Bolt, Nut & Screw Machinery


Power Presses


Rolling Mill Machinery


Wire Mill Equipment


Sendzimir Mills and other Special Machinery



EXCLUSIVE...

At Sun Ship, STAINLESS STEEL is synonymous with EXCLUSIVE, because Stainless is never exposed to contamination by fabrication with ordinary carbon steel tools.



Working with the 300 to 400 series of alloys, clad steel, aluminum and other alloys, Sun fabricates pressure vessels, tanks, towers, troughs, autoclaves, reactors, hoppers, platework and machinery in all sizes and types. Each to exact specifications. Each with an additional quality feature... EXCLUSIVE.

SUN SHIP

BUILDING & DRY DOCK CO.
CHESTER, PENNSYLVANIA



Got a pain in the neck?

IF GRINDING PROBLEMS ARE GIVING YOU A PAIN IN THE NECK, SWITCH TO CINCINNATI (PD)° WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

And we're definitely not sticking out our neck when we make these claims, because through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.* So, we think you'll agree it's worth investigating CINCINNATI (PD) WHEELS right away.

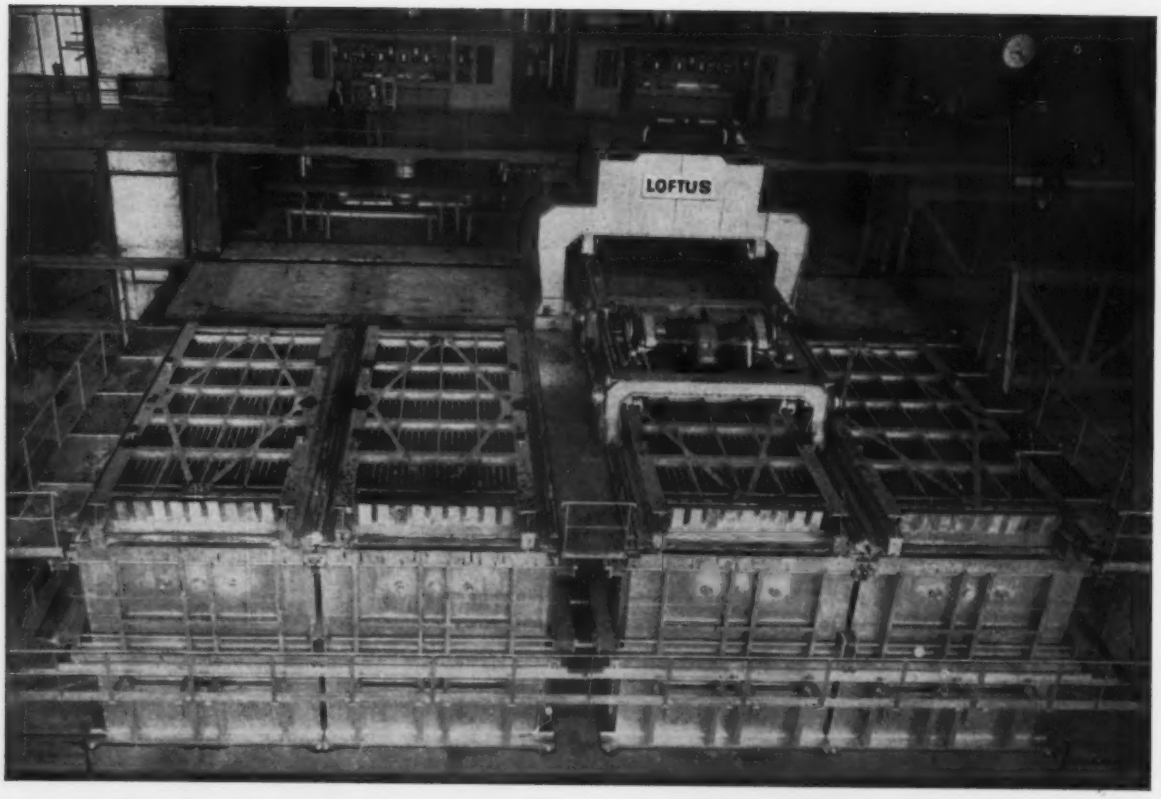
Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION.
°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

CINCINNATI° Grinding Wheels



LOFTUS PIT FURNACES

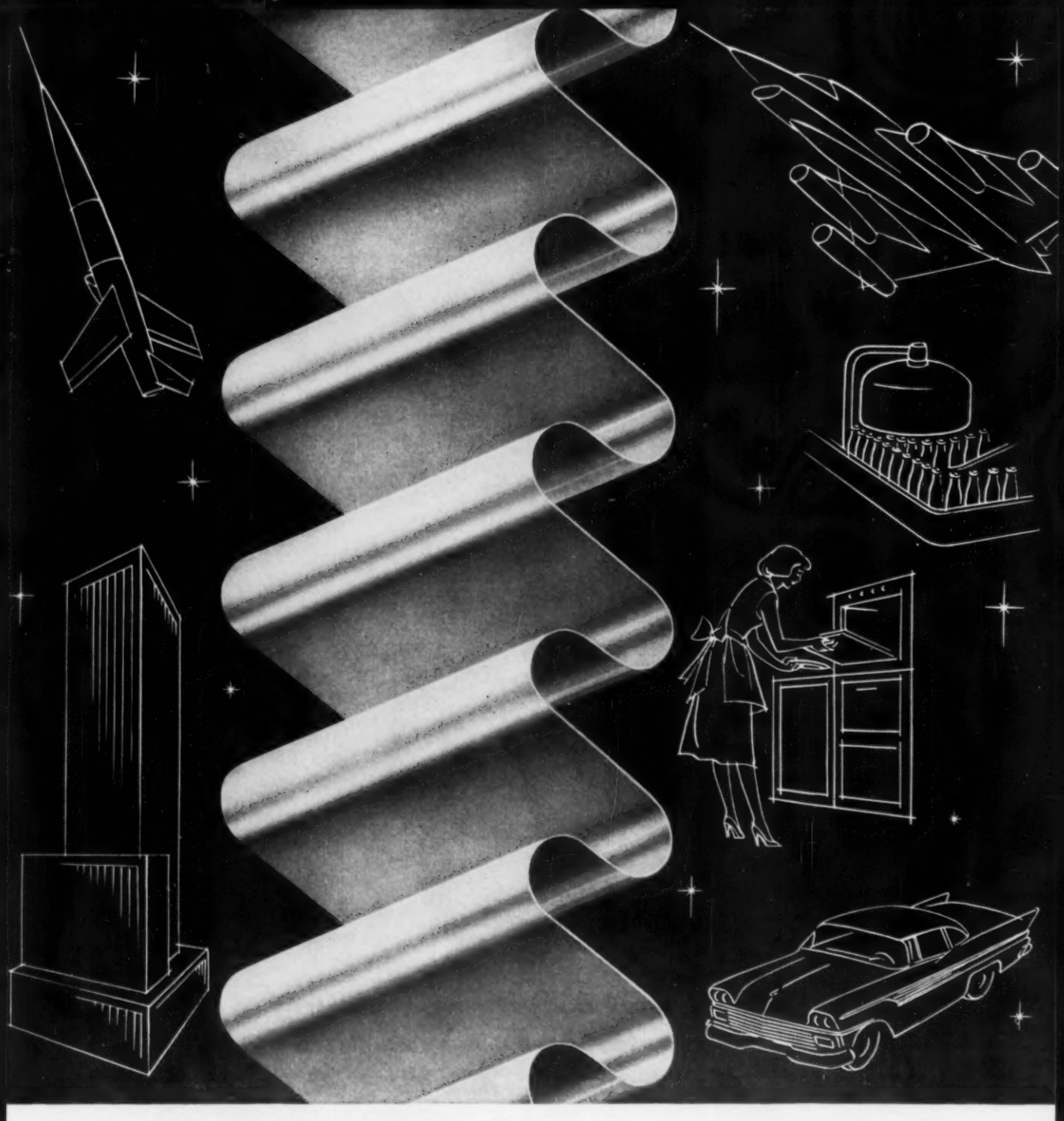
Insure top performance for each investment dollar, with the following distinct advantages:

- **Less investment with multi-purpose cover crane**
- **More production with heat acceleration**
- **More economy with integrated recuperation**
- **More uniform soak with flame tempering**
- **More setting capacity with top firing**
- **More flexibility with any fuel combination**
- **Less maintenance with flush carriage rails**

We solicit an opportunity to discuss your requirements—without obligation.

From first heat to heat treat, look to . . . **LOFTUS**
Engineering Corporation
1 Gateway Center, Pittsburgh, Pa.

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J&L STAINLESS STEEL

The Solution for Many Basic Engineering Problems

Product designers, industrial designers, and engineers find stainless steel provides advantages no other commercial metal can offer. Its ability to fabricate readily into design, its high tensile strength, its resistance to distortion under extreme hot or cold applications, plus its corrosion-free properties, gives stainless steel a distinct advantage over other basic metals.

J & L offers a wide selection of quality stainless sheet and strip to extremely close tolerances up to widths of 48". Write for these technical data:

1. Laboratory Corrosion Data.
2. Data Sheets (please specify the grades in which you are interested).

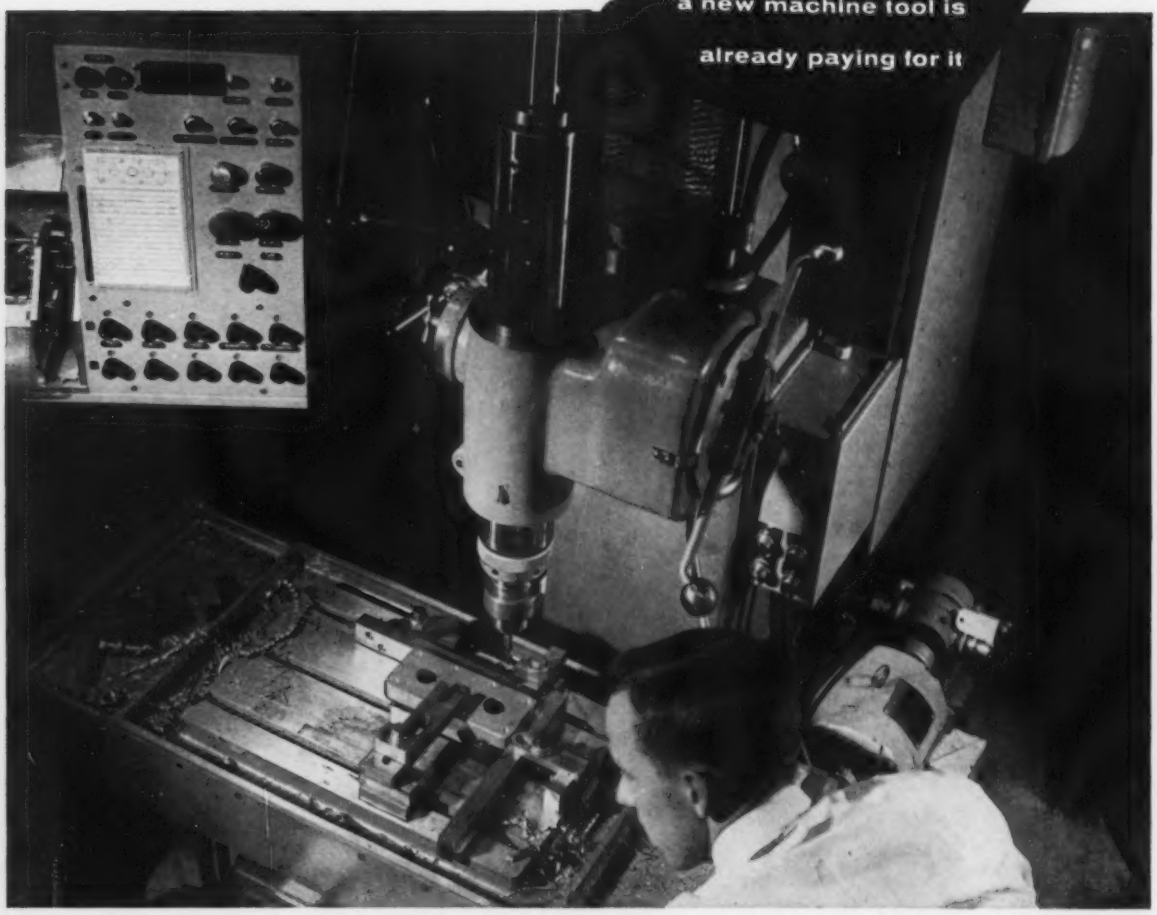
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AT THE METAL SHOW
OCTOBER 27 THROUGH 31
CLEVELAND, OHIO

Improve your Products with . . .
J&L STAINLESS STEEL
BAR • WIRE • SHEET • STRIP

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34

JONES & LAMSON "AUTOMATION"

the man who needs a new machine tool is already paying for it



Numerical control positioning eliminates jigs – saves time

The J&L Numerically Controlled Positioning Table quickly and accurately positions work pieces to an accuracy of ±.001″ — without jigs. And it can do it economically with any lot size down to a single piece.

For instance: in one installation, where precision parts previously had been machined on a conventional spacing table, J&L's new equipment achieved cycle time savings of six minutes per piece and set-up savings of over 116 minutes per set-up, or a total savings of 6.95 hours on a lot of 50 pieces.

In another plant, the cost of building $4,000 worth of jigs was eliminated during the first six weeks of operation. And in still another operation, the positioning table not only reduced set-up and cycle time, but also eliminated the storing, handling and maintenance of $29,000 worth of jigs.

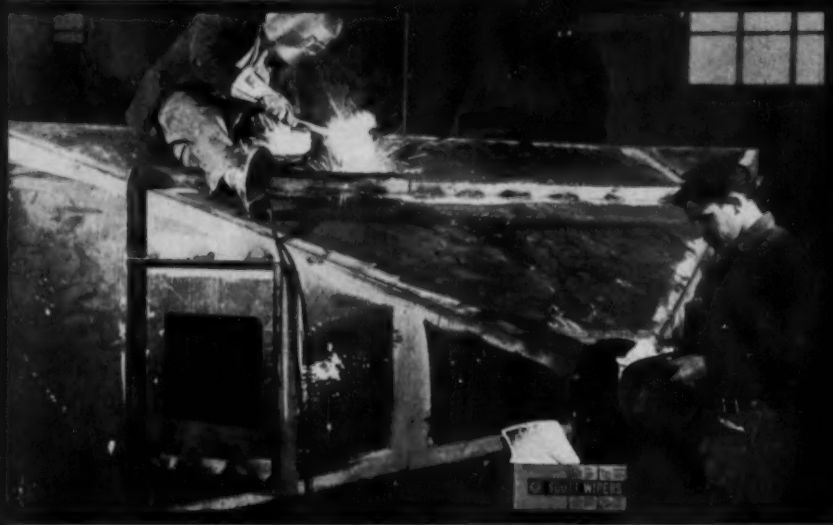
You can get in on this kind of savings too. Write to Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

people buy Scott Wipers for many reasons:



Mr. Swenson reports: "Prat-Daniel uses Scott Wipers for wiping bearings and shafts in the balancing department; for wiping steel plate prior to layout and processing; for wiping up oil and grease; for cleaning welders' face masks, and many other tough jobs."





Prat-Daniel says: "We save 40% annually with Scott Wipers... and eliminated a fire hazard!"

The Prat-Daniel Corporation, South Norwalk, Connecticut, makes fan-stacks, fans, tubular and spiral dust collectors. Mr. Inge Swenson, General Superintendent, tells us: "We used waste before, and employees got the habit of letting oil-soaked heaps of waste accumulate. Now we dispose of Scott Wipers daily." As Mr. Swenson says, much work here is of a dirty, grimy nature, and employees like soft, absorbent Scott Wipers fresh from the box each time for wiping hands and face. Scott Wipers were first tested for 2 months in the bearings department —considered the toughest test—and their success here led to use throughout the plant. Annual savings: 40%.





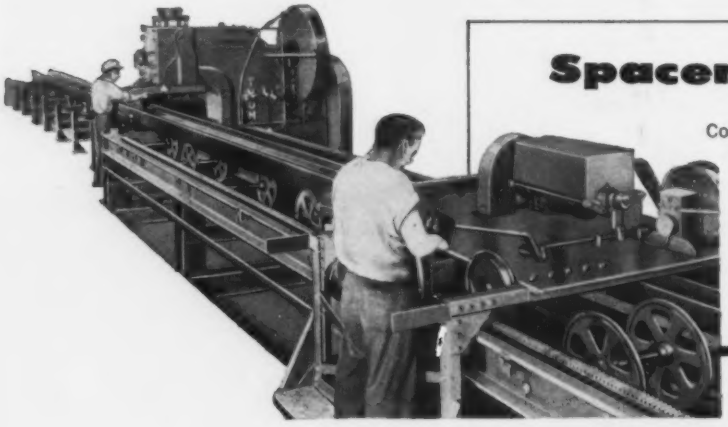
SCOTT PAPER

Get the Prat-Daniel case history and others, covering many fields, from your Scott distributor (Yellow Pages: "Paper Towels"). Or write: Scott Paper Company, Department IA-810, Chester, Pa.

Maker of the famous Scott paper products you use in your home.
See "Father Knows Best" on CBS-TV.

the trend is to THOMAS *for*

PUNCHING and SHEARING

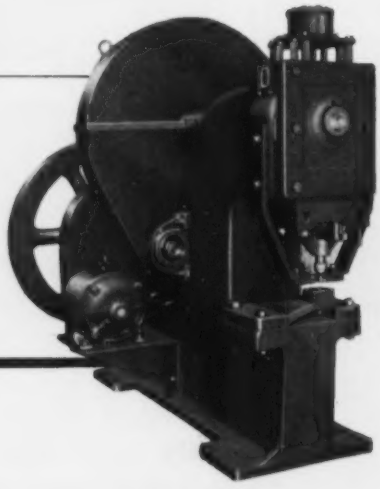


Spacer Punching

Complete elimination of layout costs is a major saving when Thomas Spacing Machines—either Motorized Indicator or Full Automatic — are used. Additional advantages are greatly reduced material handling; faster punching and greater accuracy.

Detail Punching

Thomas builds Detail Punches in a wide range of sizes. These, too, have all the modern design features such as Push Button Clutch Control; Anti-Friction Bearings; Steel Gears and Air Counterbalance.



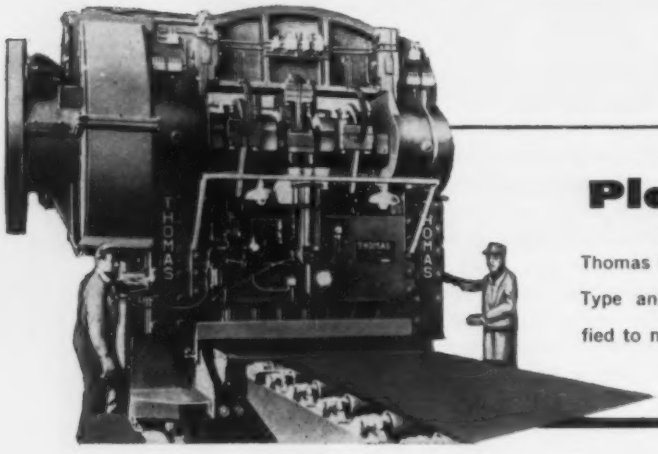


Plate Shearing

Thomas Plate Shears are of the Heavy Duty Mill Type and are individually designed or modified to meet individual customers' requirement.

Thomas also builds BAR Shears, BILLET Shears, Double ANGLE Shears, Wall DRILLS and other machines for the structural fabricator.

THOMAS
MACHINE MANUFACTURING CO.
PITTSBURGH 23, PA.

72

AMBALLOY... A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS



How Byers' metallurgical control program helps specialty steel users

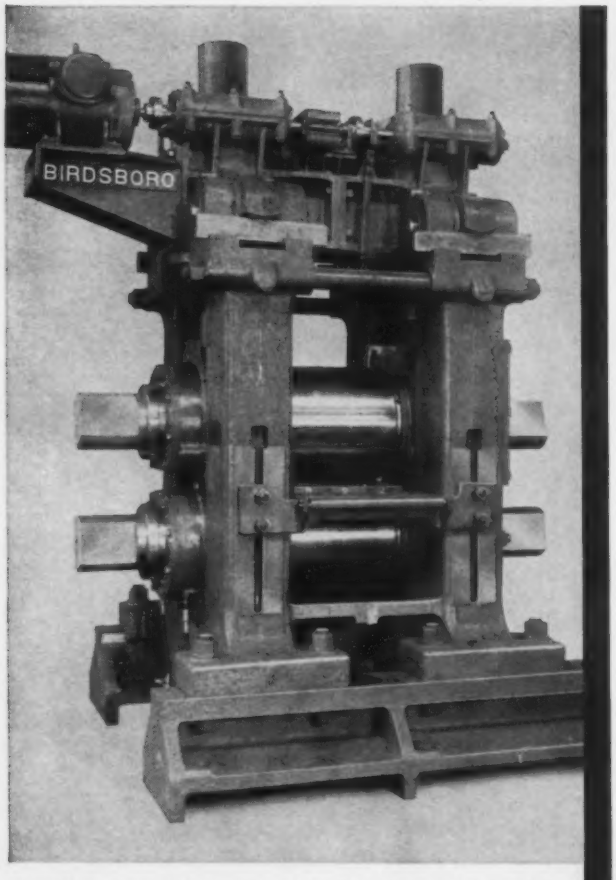
Quality-assurance provisions guard the uniformity, cleanliness and physical properties of Amballoy specialty steels. From raw material selection to delivery, a close-knit program of metallurgical control assures adherence to your most exacting requirements.

The entire Byers operation—size, personnel, furnace practice, laboratory analyses—has the flexibility required to follow through each heat, every step of the way. No once-over lightlies, ever.

We're talking about follow-through with magnetic particle inspection. Supersonic reflectoscope testing. Determination of inclusion content. Sampling. Quantitative expression of results. We're riding herd on quality—in this phase—and every other phase of our steel-making process.

You have every assurance that our high-grade specialty steels—alloy, stainless and carbon—will be tailor-made to *your* requirements. We'd like to talk with you about them. Call ATlantic 1-8110 or write: A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

Metallurgical control, every step of the way **A. M. BYERS COMPANY**



Birdsboro 22" 2-High Reversing Mill for Rolling Nuclear Metals

BIRDSBORO

engineering helps industry solve problems in rolling new 20th Century metals

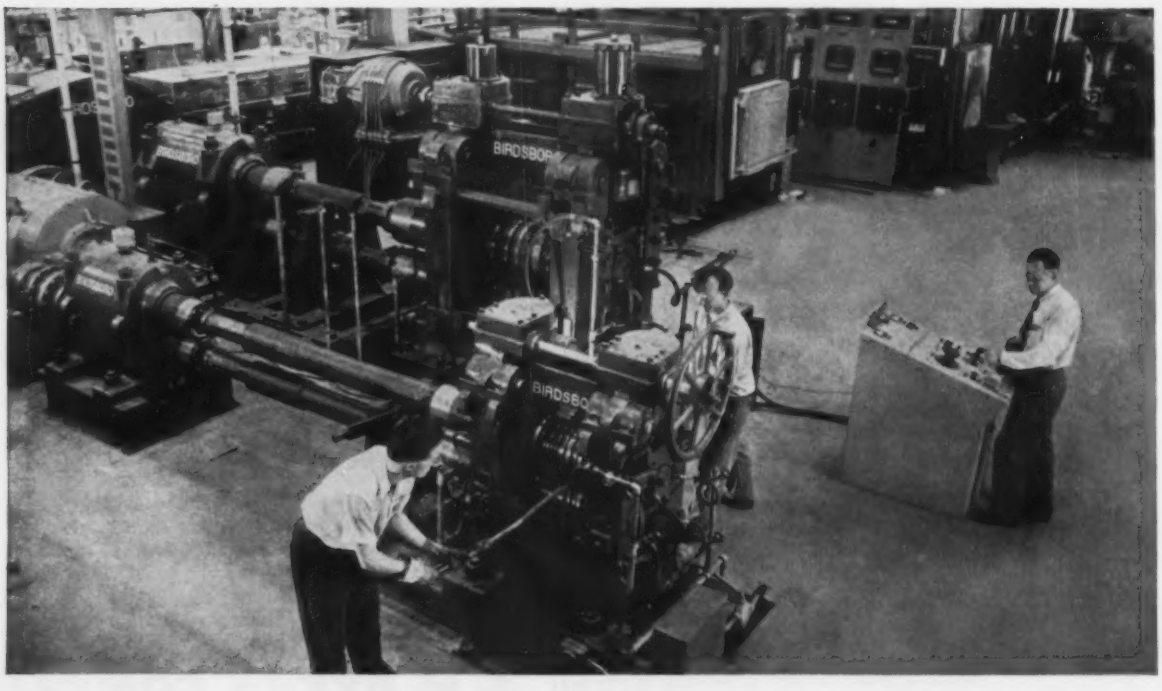
• Important advances are being made in the processing and fabrication of new alloys. Many of these developments have been made in cooperation with Birdsboro engineers and incorporated in Birdsboro mills. Take this opportunity now to learn more about what is being done, and what can be done in the rolling of 20th Century Metals. Contact: *Main Office, Engineering Department and Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

MM-64-58

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Birdsboro 16"-10" Bar Mill with Combination Drive for Rolling New Alloys





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- **42%** increase in roof life
- **20%** reduction in refractory costs

For further information on how you can profit with B&W Kaocrete-32 in electric furnace roofs, consult your B&W refractories representative or send for technical bulletin RR-46.

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R589



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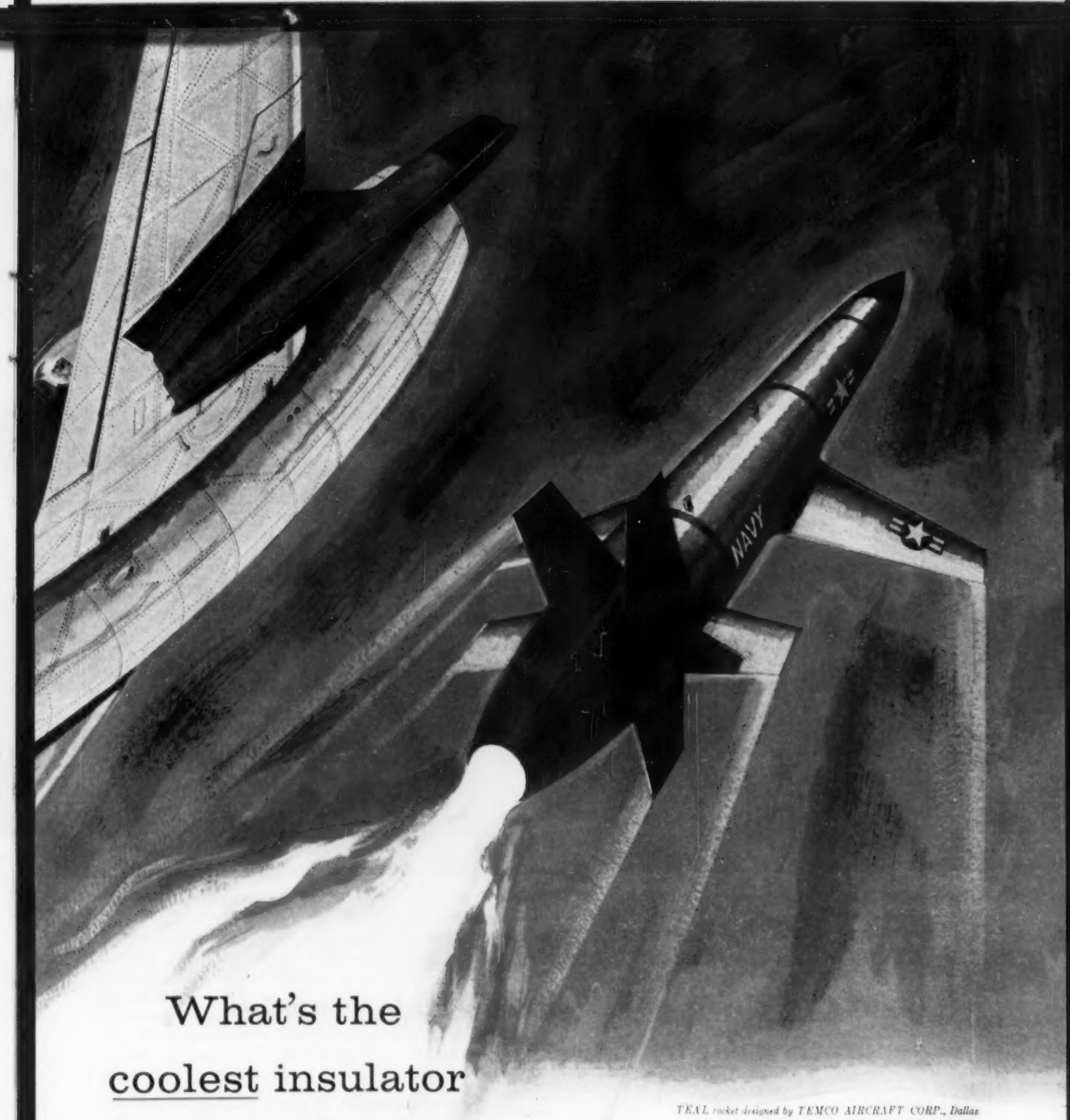
Only Federal can offer you actual single source responsibility with major line components of resistance welders, punch presses, mechanical welder presses, automatic arc welders, expanders, destackers, transfer equipment and digital control – all designed and built in Federal's plants.

Federal pioneered and are leading designers and builders of packaged lines. Talk with a Federal representative when next you're planning production welding or press equipment.

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This is the heat insulator Formica research developed by combining great mechanical strength with high heat resistance. It has helped break the heat barrier in aviation, missile and space craft.

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Type 304 stainless plate, dimensions: 6⅛" thick x 75" diameter. Weight, 8655 lbs.

take a look

...at the clean edges of this stainless plate accurately cut by Carlson

THIS stainless plate illustrates something that's almost a Carlson exclusive. Few producers can make plates of such heavy gauge, and fewer still have the long experience in flame cutting stainless to precise dimensions. To develop the proper equipment, the exact gas and iron powder formula, and the special nozzles, took Carlson engineers years of effort. But the result was worth it.

The edges achieved by these improvements reduce the cost of subsequent machining operations. And every Carlson stainless plate—whether heavy or light gauge—carries its own identification. Its chemical and physical properties are known and recorded. Its dependable performance on the job is assured.

The complete reliability of every Carlson service will materially reduce your ultimate costs. Our specialists make certain that your instructions are followed in every detail. Write, wire or phone for further information on all our services in stainless steel.

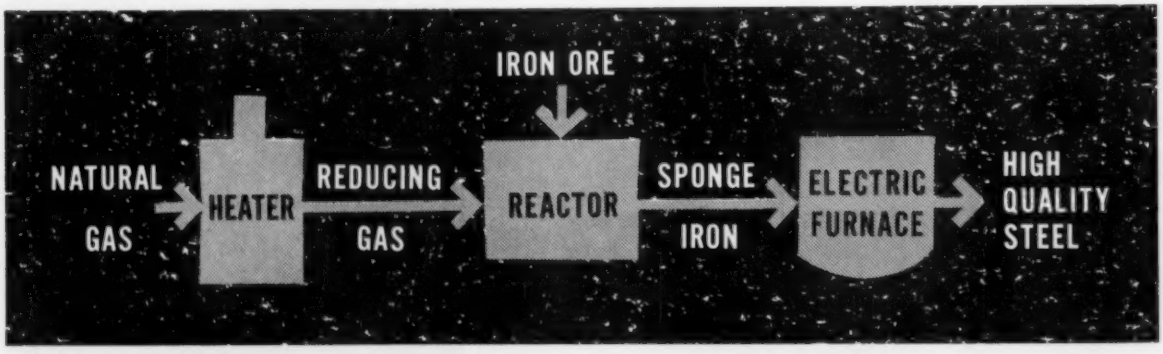
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NEW Sponge Iron Process opens new economics– new areas of operation for steel making



A steel industry based on iron ore and natural gas or petroleum is economically and operationally practical using a direct reduction process available through The M. W. Kellogg Company, exclusive world-wide sales and licensing agent. The process yields a sponge iron which can be substituted for the pig iron or scrap charge to electric or other melting furnace.

The success of the sponge iron process has been firmly established in a 30 ton per day pilot plant and a 200 T/D production plant operated by Fierro Esponja S.A., an affiliate of Hojalata y Lamina S.A.—one of Mexico's principal steel producers. Based on the success of the present plant, HyL has awarded Kellogg a contract to engineer and construct a 500 T/D plant incorporating further improvements in thermal efficiency and materials handling.

Reduction of ore to sponge iron occurs in a controlled-atmosphere reactor. Neither coal nor limestone is required. Small, low-investment plants can be designed to meet practically any need and can be constructed at far below the cost of a blast furnace. The process was developed by Hojalata y Lamina—parent company of Fierro Esponja. The problems of economically obtaining a reducing agent from natural gas or petroleum, and of engineering and constructing the 200 T/D plant, were solved by Kellogg on the basis of its extensive experience in furnace engineering and hydrocarbon processing.

The M. W. Kellogg Company is a world-wide organization which specializes in engineering and constructing plants involving complex chemical processes. This experience qualifies Kellogg to engineer and construct plants using the sponge iron process. For those desiring further information, a booklet explaining the sponge iron process in more detail is available. Arrangements for screening a motion picture showing the sponge iron process in action may also be made by writing The M. W. Kellogg Company.

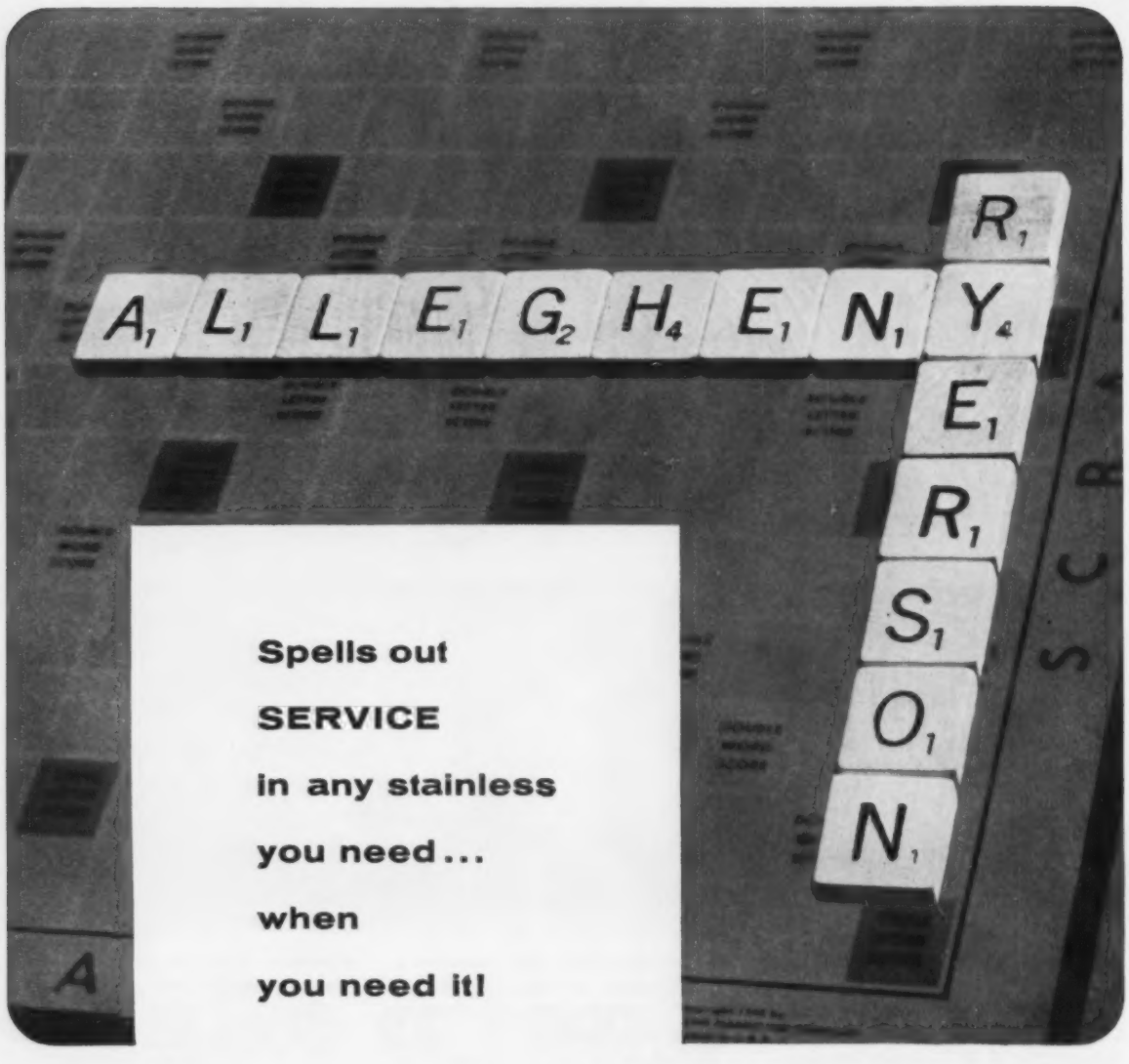
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Experience**—the extra alloy in **Allegheny Stainless



You can win only when you buy Allegheny Stainless from Ryerson. Two top names are teamed to give you quality stainless, the fastest way possible!

Allegheny Ludlum is the leading producer of stainless steels in all forms. Ryerson is recognized as the top steel service center. It's a team to bring you the best quality stainless, quick, when you need it.

Ryerson now stocks 2,351 shapes, sizes, finishes and alloys of Allegheny Stainless. It's the most complete line of stainless anywhere! And Ryerson takes the inventory cost from you, gives you as quick service as your own stockroom.

Whether your order is for Allegheny Stainless sheet, plates, bars, or whatever, Ryerson has it in stock. Trained salesmen and technicians to help in selecting or in fabricating are at your beck and call.

For top quality Allegheny Stainless from warehouse stocks, call Ryerson. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

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for warehouse delivery of Allegheny Stainless, call RYERSON

Export distribution: AIRCO INTERNATIONAL

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When fast mobility counts... depend on LIMA truck-mounted cranes

LIMA truck-mounted cranes guarantee you the equipment mobility you need to reduce profitless trip time between jobs. They give you, too, the *on-the-job* mobility that makes a job go faster for greater profit to you. In addition to mobility, LIMA truck cranes offer you these important benefits:

They are completely versatile . . . as a shovel, crane, dragline, pullshovel

They are available in 6 x 4, 6 x 6, 8 x 4 and 8 x 6 carriers

LIMA truck cranes are engineered for peak performance under the most rugged conditions . . . without costly maintenance downtime

Truly, no other machine gives you as much as LIMA. You'll know why when you investigate. Call your nearby LIMA distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corp., Lima, Ohio.

COMPARE! No other machine gives you as much as LIMA!

1. *Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.*
2. *All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.*
3. *Main machinery is placed well back of center of rotation to eliminate excess counterweight.*
4. *Propel and swing gears and power take-off are enclosed in sealed oil bath for dirt elimination and smoother, quieter operation.*
5. *Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.*
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7. *Torque converter (optional) automatically adjusts speed to load requirements—minimizing shock loading, making performance smoother and faster.*

Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (½ to 6 cu. yds.), cranes (to 110 tons) and draglines variable.

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LIMA truck crane and LIMA crawler mounted crane equipped with 100′ booms erecting a gas line at a steel plant.



Two Lima Type 54-T truck cranes, equipped with 40′ and 50′ booms, setting 31-ton, 50,000 gallon capacity tank.



Lima Type 44-T truck crane, equipped with a 90′ boom, placing concrete on a new junior high school building, Dallas, Texas.



AUTOCAR MOVES RED HOT INGOTS

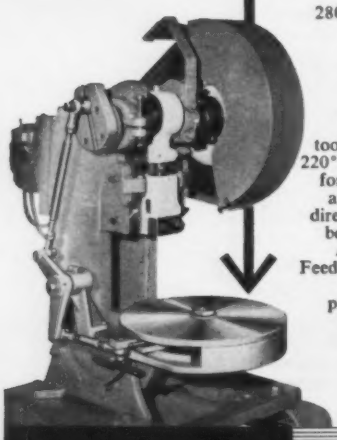
Autocar cuts cost in transporting ten-ton red hot ingots from steel mill to rolling mill at Dofasco, Hamilton, Ontario. Rugged Autocar tandems are pulling specially-designed, brick-lined trailers carrying 50 tons of these red hot ingots . . . another example of special Autocar applications that do the tough jobs better.

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Autocar Division, The White Motor Company, Exton, Pa.

Make Your Press Almost Automatic!

The new benchmaster Dial Index Feed



FOR PUNCHING, RIVETING, STAKING, ASSEMBLING!

Now you can get a finished part or perform an assembly operation with every revolution of the punch press flywheel... with extreme operator safety and at strokes up to 280 per minute! Choice of 12" or 15" tables, 10 or 12 stations.

LOW HEIGHT—only 2⅜" overall... allows greater use of press shut height, more space for tooling! Repeats accurately, 220° dwell between indexing for ample tool engagement and withdrawal. Attaches directly to bolster area. Can be used with Benchmaster Automatic Friction Roll Feed. All wearing parts heat-treated. Special dropoff provided for in mounting base. Fits Benchmaster presses and most others.

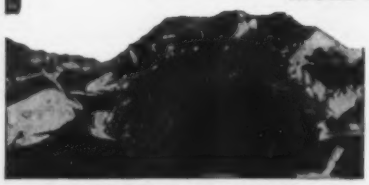
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There IS a Difference...

...a BIG DIFFERENCE in Cold Drawn Bars

Contrary to popular belief, all cold drawn bar steel is not alike. There is one big difference worthy of your specification—the Bliss & Laughlin difference.

Only B&L Lusterized® cold finished bars are different from all others. B&L bar steel is cleaner, brighter, easier to handle. The exclusive B&L cold finishing process (patent applied for) removes drawing oils, lime and processing grit, producing a smooth, gleaming bright surface without processing contaminants to slow your production. And B&L special protective oil keeps dirt, dust and other airborne contaminants from the Lusterized surface until you are ready to process the bars.

This big difference over other cold finished bar steel is another benefit developed from B&L research since 1891 to produce better cold finished bars.

You can see the difference. You can work the difference advantageously. Since you pay nothing extra for B&L Lusterized bars, it is always rewarding for you to specify "Bliss & Laughlin Lusterized."

Originators of LUSTERIZED® Finish—The BIG DIFFERENCE in Cold Drawn Bar Steel

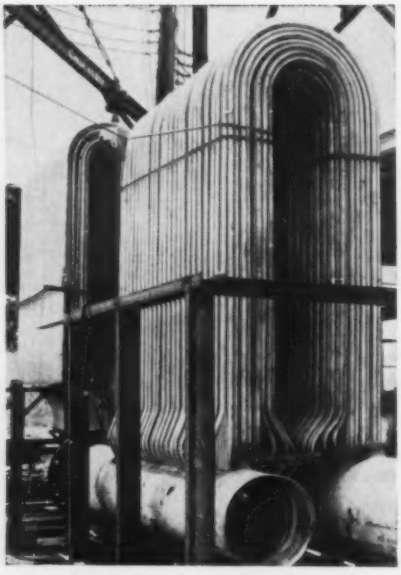
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Specialists in Finish, Accuracy, Straightness, Strength and Machinability

1600 Carpenter bends

harness 2,000,000 lb. of corrosive hot air per hour



Conventional stainless steel tubing couldn't do the job. Six miles of tubing was needed, 1600 U-bends for a four-stage heat exchanger that raises 560 pounds of air from 350° to 700° F *each second.* The exchanger, one of the largest ever built, is being used in a gas-turbine aircraft engine test program.

The problems were carbide precipitation and loss of corrosion resistance due to the operating temperature. The problems were eliminated easily . . . with Carpenter Type 321 welded and cold drawn stainless tubing stabilized with titanium.

When something extra in uniformity, economy and low-cost service is needed, you'll benefit by contacting the Carpenter distributor or representative in your area. For complete data on the many analyses of Welded Stainless Tubing and Pipe available from distributor stocks or our mill, write for Bulletin T.D. 120 on your company letterhead. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.—The House of Corrosion Control.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"

your master key to cost-saving corrosion control

Carpenter

stainless tubing & pipe

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YOU GET THE TYPE BEST SUITED FOR YOUR PLANT ELECTRICAL SYSTEM...

PLUS... the assurance of continuous, dependable service!

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For your main plant substation, Wagner Liquid Filled Industrial Power Transformers are available in standardized ratings through 10,000 kva.

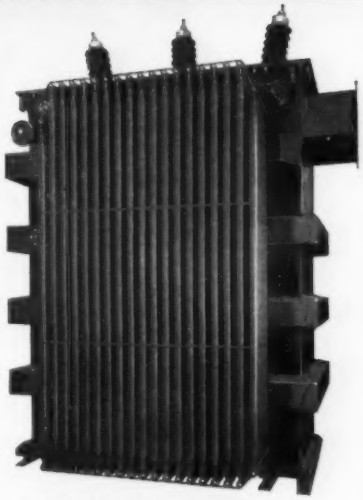
For your load centers, Wagner can supply Unit Substation Transformers in any of the types shown below, furnished with suitable incoming line sections, to meet your particular requirements. These PRE-DESIGNED transformers will save you time and save you job engineering costs. You can specify the secondary switchgear you prefer.

All Wagner Industrial Transformers are liberally designed, sturdily constructed, thoroughly tested and able to meet the heaviest industrial demands. They assure continuous dependable power for years to come.

For expert advice on your present and future plant transformer needs, call or write the Wagner branch near you.

Wagner Electric Corporation
6403 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U. S. A.

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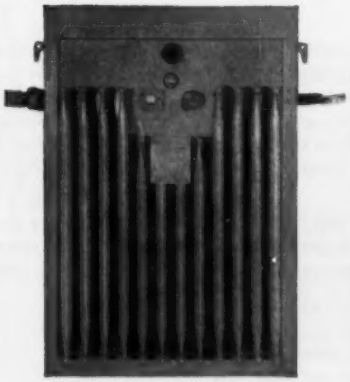


WAGNER INDUSTRIAL POWER TRANSFORMERS

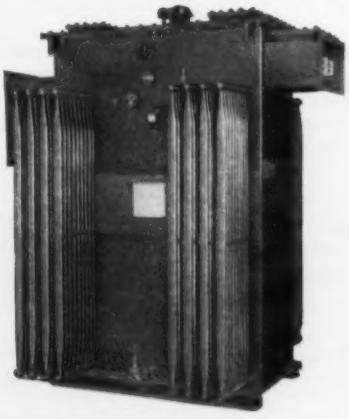
Oil-filled, for outdoor installation, available through 10,000 kva, 67 KV and below. Noflamol filled, for explosive atmospheres, available through 7,500 kva, 15 KV and below.

Wagner **UNIT SUBSTATION TRANSFORMERS**

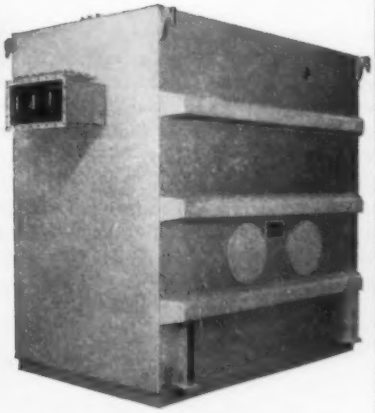
112½ to 2000 Kva—three phase, 60 cycles, 15 KV and below



NOFLAMOL Non-inflammable liquid-filled. For indoor or outdoor installation, where explosive liquids or gases are present. The close-coupled design illustrated fits flush against switchgear enclosures. Throat connected designs are also available. 55°C rise, self-cooled or forced-air cooled.



OIL-FILLED Generally installed outdoors. Can be used indoors in fireproof vaults. Outdoor transformers can be connected to indoor switchgear using weather-proof bus-duct. 55°C rise, self-cooled or forced-air cooled.



SEALED DRY-TYPE Suitable for indoor or outdoor use, completely fireproof, easy to clean and maintain. Sealed tank is filled with nitrogen under low pressure. Insulated for 150°C rise, self-cooled.

WT58-6A



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The compact, multi-purpose "Buffalo" Universal Iron Worker saves space, time and work. It occupies the space of only *one* machine, yet performs up to *six* operations. The UIW will handle up to three jobs *at once,* thus saving much labor and time in conveying work.

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Contact your "Buffalo" machine tool dealer for a demonstration of the UIW—see how it can streamline *your* shop operations. Or, write for Bulletin 360-G for full details.

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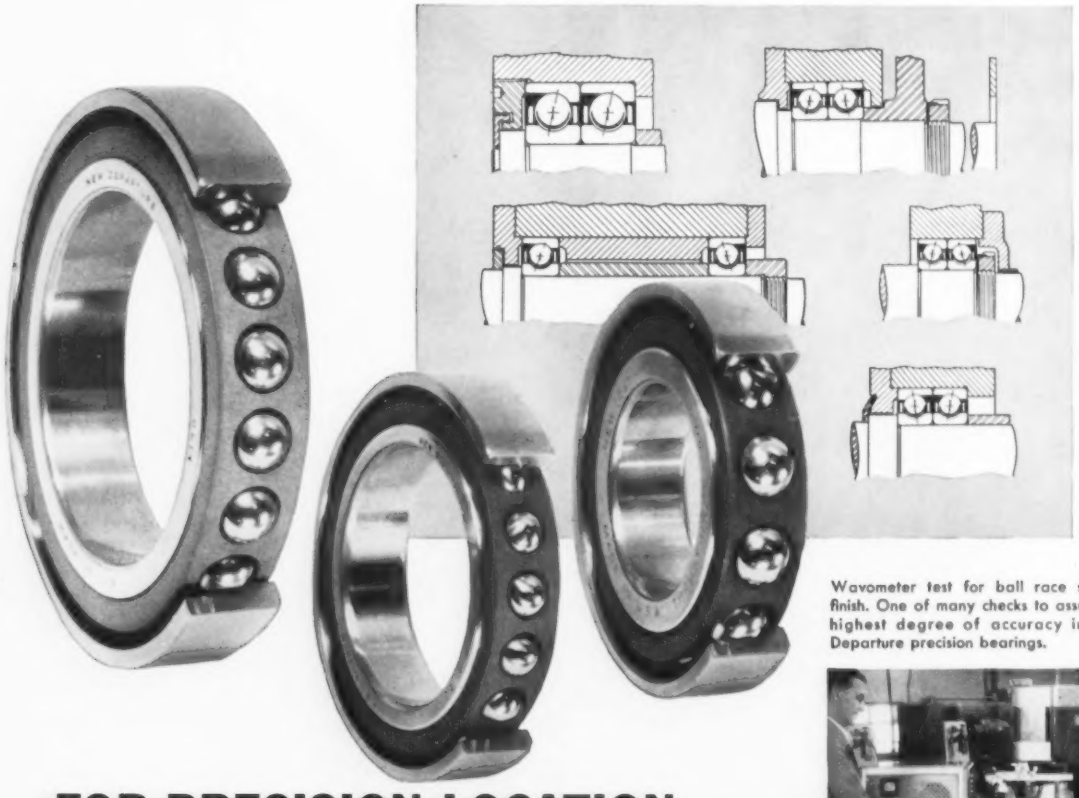
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1908–1958 GM FORWARD FROM FIFTY

NEW DEPARTURE

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL

Strength in Titanium Welds

After years of seeking a high strength titanium alloy that can be welded, researchers have found a Ti-3Mo-0.25Be alloy that shows commercial promise. Because of low-alloy content, it may work to closer dimensional tolerances in large sheets than present alloys of the same strength level.

Test Resin for Castings

Emerging from the test stage, an impregnating resin for casting runs like water, requires no vacuum and has a room-temperature shelf life of nine months. Thus far it's proven resistant to acid, oil, fuel and oxidation. A major independent foundry gives the material an excellent rating. It should be announced on the market in the not-too-distant future.

Develop Undersea Transport

Studies are well underway to develop high-speed undersea transport. Experts say such cargo subs, presumably atomic powered, would travel at 60 knots or more. Model tests show sausage-type rubber containers can haul a million gal of oil, or other materials such as grain, coal and ores in a slurry.

Orders Ahead of Production

Automakers, running into trouble getting volume production of 1959 models underway, have altered original production schedules. In some cases revised schedules call for maximum overtime through November. Initial response to new models has been better than anticipated. Buick for example has orders running four to five weeks ahead of production.

Want Faster Scrap Charging

Openhearth shops may be nearing the limits of production acceleration. With oxygen and other improvements, furnaces designed for 20 tons an hour are now giving 30 and even 40 tons. Result is a traffic jam in and around the shop. Ingot mold life suffers due to reduced cooling time. Mills are searching for faster, more compact scrap charging systems.

Interest in Roller-Leveler

Sheet mills are reported showing new interest in a precision roller-leveler. According to the maker the machine gives the flatness of a stretcher-leveler. Until recently it was used mostly for special jobs. Now it's being applied to leveling coils on a production basis.

To Forecast from Earnings

Third quarter earnings statements of steel mills will be eyed carefully by steel users. The purchasing department of one plant has advised its management to look for a $2 increase in steel base prices around the first of the year, unless the mills show a sharp increase in earnings.

One Drawback to Red Trade

India is increasingly worried over the effectiveness of Soviet propaganda on her citizens. "With every bag of cement we get from the Reds, we have to take 10 bags of propaganda," says a trade official. Real reason for concern: India's masses can be a push-over for skillful Communist propaganda.

Plastics to Oust Leading?

A new plastic formulation just developed will take the place of automotive body "lead". The new material will be lighter, cheaper and simpler to apply. It's also expected to cut labor costs on hand finishing. Another use is on missile aero surfaces to smooth rivet and weld irregularities.

Brazing for Large Parts

Brazing is on the increase for precision complex assemblies. Some specialty suppliers are building large size vertical furnaces to handle parts up to 6 ft diam in controlled atmospheres. This design permits closer tolerances specified for atomic energy and missile work, cuts down distortion.



Cleveland drives help control scale and corrosion in steam generating plant

Ten pumps, driven by Cleveland speed reducers, hold a key to successful operation of the $80 million Valley Steam plant of the Los Angeles Department of Water and Power. Clevelands provide those pumps with the correct speed required to feed accurate volumes and proportions of scale control chemicals into the water system.

Supplying needed power with smooth, uniform torque, Cleveland speed reducers incorporate case-hardened worms and nickel-bronze gears for years of trouble-free service. That's why Clevelands are found in most applications requiring compact, dependable speed reducers.

See how a Cleveland right-angle speed reducer can benefit your operation or process. Ask for Bulletin 145. Write The Cleveland Worm & Gear Company, 3282 East 80th Street, Cleveland 4, Ohio.



Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

Industry Is Meeting Challenge Of the Electronics Age

Closer working partnerships of metalworking and electronics are a sign of the times.

You can look for more teaming up as electronics grows in importance in military and industrial equipment.

▪ Electronics' growing importance in military and industrial equipment is bringing metalworking and electronics into closer working partnerships.

In one way or another, metalworking and electronics firms are teaming up to dovetail their efforts in the military and industrial fields.

Behind the Trend—This growing "togetherness" is due in part to the need for comparing notes on common projects, and in part to the awareness of metalworking firms that in some cases the tail is wagging the dog. This is particularly true in missiles and aircraft.

Another facet of the picture is that the younger electronics and research outfits have welcomed the partnership of well-established and soundly financed metalworking companies. The arrangements have been mutually profitable.

New Thinking—In aircraft and missiles, up to 75 pct of the overall cost, including supporting equipment, is now in electronic gear. This has forced the aircraft companies to adjust their thinking, for the simple reason that subcontracting was threatening to take the lion's share of the contract dollar.

For example: Old line aircraft firms are still eager to keep their identity as prime contractors. So those with substantial electronic divisions have hastily beefed them up. If time or circumstance didn't permit, they bought out electronic firms and integrated them into their operations.

Joint Ventures—In Washington, Government contracting officers have noted an increasing trend toward joint ventures, as opposed to outright mergers or acquisitions in the fulfillment of contracts. In these cases, metalworking and machinery firms are working with electronics companies and chemical outfits.

The Thompson Products-Ramo-Wooldridge merger is a prime example of metalworking and electronics teaming up on a permanent basis. Thompson Products is a well-established auto and aircraft parts manufacturer. Ramo - Wooldridge, formerly a Thompson affiliate, has been strong in electronics.

Here's how the two firms explained the merger:

". . . the combination of talents, skills, and experience . . . will serve to make Thompson Ramo Wooldridge a more effective, better intergrated and more useful organization in the missile, aircraft, elec-

Metalworking and Electronics Are Teaming Up

The Challenge:

The handwriting is on the wall. Modern aircraft, missiles, and industrial equipment literally teem with electronic gadgets and controls. Even autos and washing machines are not immune to the growing trend. Fortunately, industrial management has seen the need for a closer pooling of metalworking and electronics technology. It is meeting the challenge.

The Trend:

In some cases, metalworking firms are teaming up with electronics companies in joint ventures, notably in the missile and aircraft fields. In others, companies have beefed up their own electronics divisions. In still others, mergers, consolidations, and acquisitions have done the trick. Most dramatic recent example: The "marriage" of Thompson Products Co., Cleveland, traditionally an auto and aircraft engine parts maker, and Ramo-Wooldridge Corp., a Los Angeles electronics firm formerly owned 57 pct by Thompson.

The Future:

As we head deeper into the Space Age (up to 75 pct of the cost of an aircraft or missile and supporting equipment is now in electronic gear) the need for closer working relations between electronics and metalworking will grow.

tronics, nuclear, automotive, and general industrial fields.

Looking Ahead—"If the company is to continue to grow, we must move even more aggressively into the newer markets that serve the needs of the advancing age."

Meanwhile, The Siegler Corp., Los Angeles, has merged with Unitronics Corp. (Siegler handles ground support equipment for missiles). Calidyne Co., of Winchester, Mass., has merged with Ling Electronics Inc. This makes Ling the biggest U. S. manufacturer of complete vibration testing systems. Acme Precision Products, Dayton, O., has merged with Cal-Tronics, Inc., Los Angeles (rocket motors starters). Pratt & Whitney Co., Div. of United Aircraft, merged with Norden Ketay, an electronics firm; Olin Mathieson and Reaction Motors Co. have merged.

Small Firms Struggle—Sequoia Wire & Cable Co. has acquired Hall - Scott Electronics, Burbank, Calif., for entry into the missile wire and cable field. Mandrel Industries bought the entire inventory, tooling, and machinery equipment of Hall-Scott Electronics.

In the competition for missile business, it is hard for smaller firms to get a foothold, either because of limited equipment and skills, or skimpy financing. Teamed up with other firms, however, the combine can show total assets and know-how that put it in the front rank as a potential missile contractor.

Space Age Thinking — Within companies already hip deep in electronics, the advent of the space age has generated more advanced thinking. Westinghouse Electric Corp., for instance, has formed a new space technology section in the aircraft equipment department of its Lima, O., plant.

Says Westinghouse:

"The space technology section will be responsible for the development of advanced electrical systems. These systems may include special auxiliary power units which can be powered by turbine, nuclear or solar means. This section will also have the responsibility for devices and other products for flight vehicles associated with the space age."



TITANIUM 'BOTTLE': Typical of Space Age demands on industry is this titanium helium pressure vessel fabricated by Thompson Products' experimental manufacturing works for Convair's Atlas ICBM.

Military Will Ask For Fewer Industry Secrets

Military buying officers are likely to make fewer demands on industry for technical data to accompany supply contracts. A revision of part of the Defense Dept. buying rules to spell out this new policy is expected momentarily from the Pentagon.

The change will benefit industry contractors. They have been protesting the exposure of their proprietary data by the military.

Change Aim—The new policy is contained in the amended Part II, Section 9, of the Armed Services Procurement Regulations. This change in the ASPR is designed to:

(1) Offer guidance to military procurement officers, to reduce the buyers' calls for technical data with supply contracts.

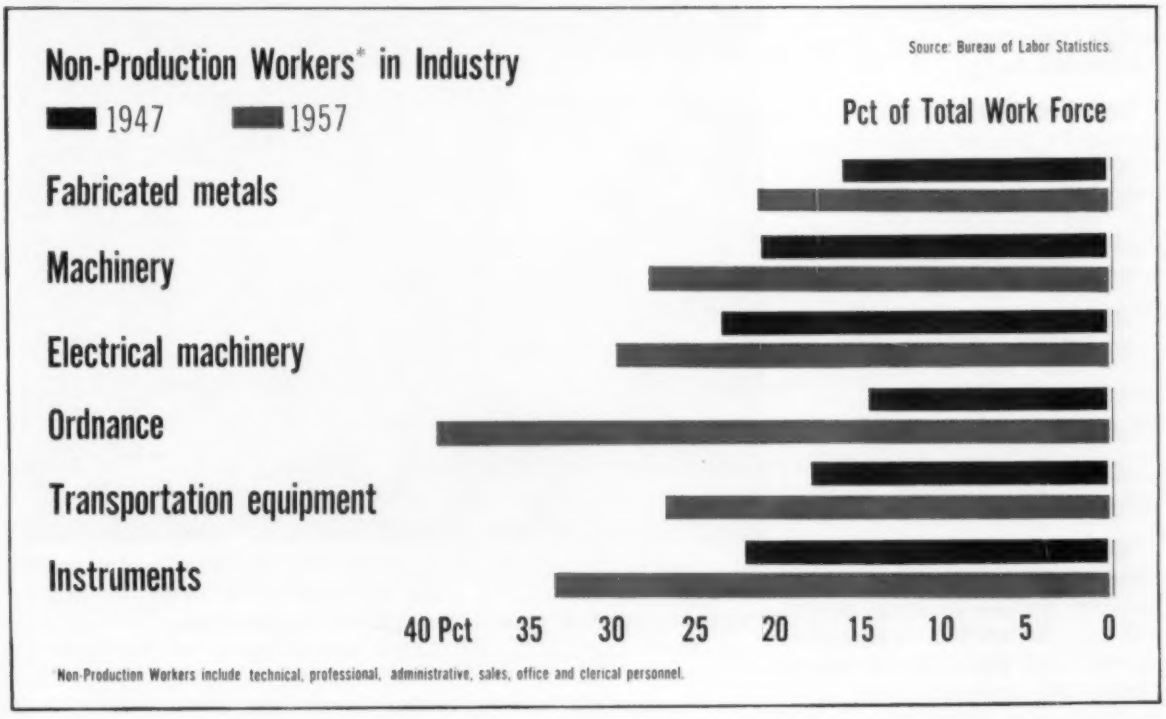
(2) To give procurement officers latitude to buy technical and background data in connection with both supply, and research and development contracts. Companies can use their own discretion as to accepting or rejecting the offer to buy data.

The Reason — Essentially, the rule changes mark a Pentagon move toward the industry position regarding proprietary data. Since April 1957, when the present Part II was issued, firms and industry associations have complained of Defense Dept. treatment of the data.

Defense Dept. definition of proprietary data is too limited, said industry. The Defense Dept. has considered proprietary only data which could not be discovered by reverse engineering. But industry prefers to treat any data which it wants to protect as proprietary.

Assisted — Representatives from industry, including aircraft producers, aided the Defense Dept. in preparing the changes in Part II. The revision apparently will be more keenly appreciated by defense contractors than by Congress. It is possible the lawmakers will consider the revision a step toward single-source procurement.

Metalworking: Non-Production Force Grows



Can Industry Fill Space Age Jobs?

Metalmaking and using industries are gobbling up an increasing number of technical and professional workers.

More training action needed to keep pace with our rapid technology.—By P. J. Cathey.

▪ Can metalworking fill its mushrooming need for technicians and highly skilled workers?

As the Space Age develops metal producers and users are relying more and more on technically trained employees (see chart). It's significant that demand for production workers in durable goods industries like metals remained steady in the last five years. There were about 7,500,000 production-line jobs in 1952 and the same number in 1957.

But total employment in durable goods rose almost 500,000 in the same period. There was a boost of 27 pct in nonproduction workers—technical, professional, sales, administrative, and office employees.

Problems Ahead—And it's predicted by the Labor Dept. that employment in durable goods will increase more than 20 pct by 1965. Is there danger our supply of technically trained workers won't be large enough to fill demands?

Much attention has been focused on the fact our prime worker groups (ages 25 to 44) will increase very little, in the next few years because of the low birth rate during the depression. In addition some of our lags in training have been pointed out.

Despite this, industry has the ability to meet its space age job needs. That's the opinion of government manpower experts. Our job training plans are basically sound, they believe.

What Can Be Done — What's needed: More action to translate plans into workers. Industry's present contribution to training is substantial, according to W. F. Patterson, Special Assistant to the Secretary of Labor. "Now it's largely a question of getting the 'non-doers' to take part," he says.

"Crash training programs are not the answer," he adds. "The best results come from the mounting effects of long-range planning."

How will the demand for more

technicians affect training policy? These trends are predicted by Mr. Patterson: More upskilling of existing workers. An increase in train-in lead time. More emphasis on theoretical training.

Upskilling Workers—On added training for present employees he says. "Upskilling the workers you you have is important. It will be more and more difficult to go outside and find pools of trained workers or those who can be trained."

On training lead time: "When a new machine goes on the production line it's too late to start training a man to operate or maintain it. If possible, consider needed manpower skills as the machine is designed and built."

Book Study But—On education: "Technology has increased the need for trainees to know more mathematics, science, mechanical drawing, and the basics in engineering and architecture. But on-the-job training will still be vital. The best trained men are those who learn by doing."

Another manpower expert, John S. McCauley, of Labor's Bureau of Apprenticeship and Training, points out even medium and small-sized firms can train to stay competitive in the Space Age. "Successful training programs," he says, "are not only for the large employer."

Changing Job Pattern—Part of the shift in the job pattern results, of course, from added emphasis on research and development. The primary metals industry, for example, boosted its research spending by 47 pct in a recent three-year span. Fabricated metal producers increased theirs by 70 pct.

But technical employment in metals is not only for research needs. Already cropping up are such technician-type jobs as space mechanic, missile repairman, automation mechanic, and ultrasonic testing inspector. Industrial unions are now classifying workers as atomic reactor component mechanics and electronic data analysts.



SHAPING UP: Sulfuric acid plant (middle left) at Freeport's nickel concentrator going up at Moa Bay, Cuba, will be among the world's 10 largest. The hydrogen sulfide plant (lower right) will be the largest.

More Nickel In 1959

▪ Despite an avalanche of problems, Freeport Sulphur Co.'s new nickel concentrating plant at Moa Bay, Cuba, and refinery on the Louisiana coast are going up on schedule. The company expects to have nickel to sell by mid-1959.

The first headache came right after the project was firmed up in 1956. A deciding factor in Freeport's decision to go into nickel was a contract from the Government for 271 million lb of nickel at 74¢ per lb, through June 1965.

First Headache—Freeport had to fight off some critics in Washington who felt the Government should have gotten a better deal.

Then, the plant site in Cuba became disputed territory in a revolution. At one time, top construction management people were taken as hostages by the rebels. Another time, the airstrip used to bring in supplies was commandeered by the rebels to bring in arms shipments.

Freeport's plans are far from insignificant. The company will spend $119 million for 50 million lb of nickel capacity. At the concentrator, for instance, the sulfuric acid plant will be one of the 10 biggest in the world. The hydrogen sulfide generator will be the biggest.

Sales Lineup—To date, Freeport has done little but groundwork in lining up its nickel sales staff. The company says that at the beginning, at least, each salesman will cover all possible customers for nickel in his area.

Freeport also says it will offer technical sales assistance, but has not firmed up specific plans yet.

Freeport is not likely to wind up with much unsold metal for the first few years at least. In addition to the Government contract, Freeport has understandings with some steel and auto companies.

Mills See Oxygen Breakthrough

New Basic Openhearth Roof May Give the Answer

Some mills feel they have come up with openhearth roof construction adaptable to volume use of oxygen.

New design calls for arched roof using basic bricks that are both suspended and held down. —By G. J. McManus.

■ A major breakthrough seems to be shaping up for openhearth oxygen.

Some steel mills feel they have come up with an economical openhearth roof construction that stands up under volume use of oxygen. The new design calls for an arched roof using basic bricks that are both suspended and held down. Bricks have internal plates; there are plates between bricks.

Good Performance — Using this design, one furnace has turned out over 360 heats while applying oxygen throughout decarbonizing. With the new roof, openhearth men expect to increase oxygen use from 60 cu ft per ton of steel to 500 cu ft per ton. They look for a significant increase in production.

This prospect has led practically every major mill in the country to install or order at least one of the arched basic roofs. Fifteen applications are definitely known; the actual figure is probably higher. Some refractory men feel it is too soon to say the new construction has proved itself, but the mills seem to think they are on the right track.

The Background—Basic roofs for openhearths are not new. U. S. Steel's South Works has been running an all-basic openhearth since 1947. Keystone Steel & Wire Co., and Laclede Steel Co., have gone in strongly for basic roofs. Others have shown interest; there has been a longterm trend toward basic; but until recently the economics were not convincing enough to bring a wholesale conversion.

Until last year, most of the basic roofs in this country were the flat, suspended type. With this construction it was possible to operate up to 3200°F, compared with 3050°F with silica. Openhearth production rates increased materially. Indications are that basic construction will result in increased roof life from 150 heats using silica to 350 heats when using basic refractories.

Case History — Late last year, U. S. Steel's Fairless Works installed a sprung basic roof using plated bricks of 60 pct magnesite—40 pct coarse chrome ore. The first installation did not result in satisfactory performance. The modified design incorporated plates suspended from superstrucure by wire and structures running longitudinally across the furnace to hold down brick work. It has given satisfactory life.

This roof ran 368 heats with a minor patch around 290 heats. Because of its simple suspension system, it was less expensive than a flat, basic roof.

Oxygen Use — No details have been made public on the exact practice used with the furnace. It is believed that scrap charge was light; that oxygen was applied from two roof jets starting after the hot metal addition and averaged 500 cu ft per ton. Production rates are reported to have gone up substantially.

The plating system of the new design retards brick growth and the sprung arch has enough give to allow a certain amount of expansion. With the flat roofs bricks would be pinched off due to growth.

Better Brick Service — Another advantage is the suspension system. Use of bars and tabs in the new design leaves the whole brick available for service. In the flat roofs, castings were sunk into the bricks and took up a portion of the work area.

The Russian Influence

Recent reports on Russian openhearths have undoubtedly speeded the swing to basic roofs. Using suspended sprung roofs, the Russians are reported getting 600 to 700 heats from a 210-ton furnace and 450 to 500 heats from a 420-ton furnace (The IRON AGE, September 4, Page 97).

In America, mills have been approaching the oxygen and refractory problems of openhearths along various routes. One mill has been testing a sprung construction that employs a fused, cast basic brick. Others have been using roof jets in furnaces that have conventional silica roofs.

Two stumbling blocks stand in the way of increased oxygen use. One is materials handling. Many openhearth shops already face traffis jams. If they are to boost production rates further, they must find new ways to get metal in and out of the furnace.

Will Foundries Be Buying Soon?

Equipment Builders Believe They Have the Answer

Foundry equipment sales are still down.

But here's why makers are comparing notes and smiling. —By K. W. Bennett.

▪ The average foundry equipment builder is a much happier man these days. His business is still lagging. But he has been comparing notes with the rest of the industry, and discovering that the unprecedented spurt of inquiries he started getting last month was industrywide.

And what's more it is gaining rather than losing strength thus far this month.

Breakthrough—A vice president of a major foundry equipment manufacturing firm comments, "I think we're finally heading for a breakthrough. The mild, and I mean mild, recovery in foundry activity may trigger an early 1959 rise in equipment buying by the entire foundry industry."

Foundry capital equipment purchases have been off by a larger percentage each year since 1955. Early 1958 was the sharpest decline. But now, "this fall's slogan is 'Modernize or Die' " says a marketing man for a major jobbing foundry.

There are definite factors working in favor of foundry equipment men.

Better Product—First, it's generally agreed the entire foundry industry has upgraded its product at an accelerating rate since 1953. Services like Sorbo-Mat are giving the castings producer outside engineering help. And educational drives by foundry societies are giving the average foundryman more technical lore.

He is looking at more new equipment today because he feels he must have the latest and best to survive. And he is understanding more of what he sees.

A foundry can still sell on quality alone. But it's getting tougher. He's usually forced to sell on quality and low price, which means cutting costs.

This is no snap with labor costs headed up. One large jobber figures that this year's low level of operations, plus wage advances, have pushed his cupola labor costs to $13 per ton from $7 per ton in 1956.

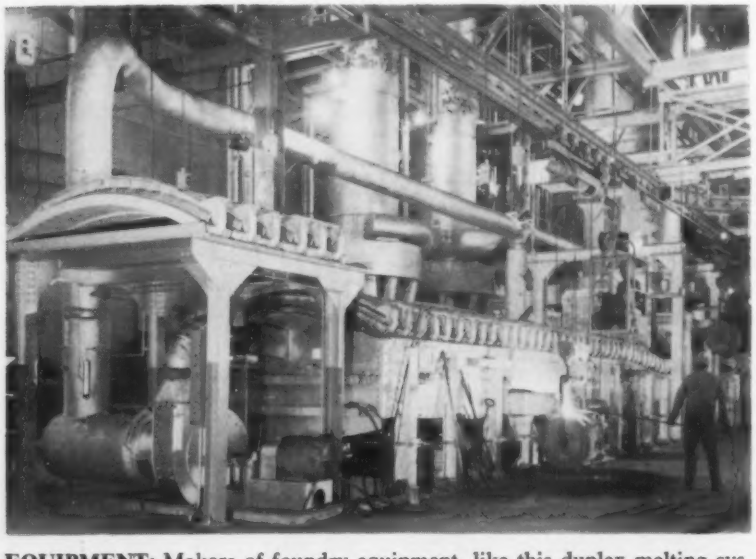
Equipment makers figure the foundrymen will look to cut costs with hot blast cupolas, small electric furnaces for low cost melting of small lot castings, more power equipment for handling raw materials, standardized pouring flasks, and generally better plant layout.

With closer process control that would come with new equipment, the foundryman can aim at new markets. Green sand molders are increasingly willing to add shell mold equipment to produce shell cores. From there, it's only a step to shell molds which feature close surface tolerance.

Close on the heels of shell molding is the ceramic shell. Misco Precision Casting says 80 per cent of its shell output will be ceramic this month. Another foundry hints at an even higher figure.

Castings of 70-125 lb are being achieved, with as much as 50 per cent gain in strength obtained by alloying. Castings of 200 pounds size are foreseen for this process.

Green sand molds, with proper process control, have produced magnesium castings of .050 in. wall thickness with a .005 in. tolerance in 189 in. lengths. Strengths of 160 pct to 200 pct of design load have been achieved in magnesium and aluminum alloy castings.



EQUIPMENT: Makers of foundry equipment, like this duplex melting system at Link Belt, are receiving an increasing number of inquiries. One reason is sharp competition is forcing foundries to "modernize or die."

Founders Told Aluminum Engine Makes Headway

GM engineers point out its weight advantage offsets higher cost.

Machining aluminum presents no impossible problems, speakers say.

▪ Two General Motors engineers have warned gray iron founders aluminum is becoming competitive with iron from a cost standpoint as engineers seek to cut weight and boost efficiency in automobile engines.

While surveys show aluminum castings cost more than those of cast iron, Dr. Robert F. Thomson of General Motors' Research Lab says, the reduced weight of an aluminum engine offsets this disadvantage.

Speaking to the Gray Iron Founders' Society in Washington last week Dr. Thomson indicated aluminum engines present no impossible machining problems. Machining rates may not necessarily be much higher than those presently used for gray iron, he noted.

"The very high silicon alloys, for example, have about 50 pct greater tool wear than conventional aluminum alloys, while conventional alloys can probably be machined faster than gray iron."

Another speaker from GM, Darl F. Caris, of the Engineering Staff, said automotive engineers are faced with increasing miles-per-gallon efficiency of automobile engines while maintaining good performance. An aluminum engine, he said, "can weigh 200 lb less than its cast iron counterpart. This would help reduce the weight of the car and also mean a weight reduction in a number of other chassis components."

An important development that makes aluminum engines look attractive for future passenger cars is application of high wear resistant alloys eliminating the need for cylinder lines, Mr. Caris explained.

"Location of the foundry adjacent to aluminum reduction plants, permitting pouring of hot metal directly from reduction cells, has effected a substantial cut in the cost of aluminum," he added. "This, together with improved foundry techniques and savings in machining, has made aluminum highly competitive with cast iron from a cost standpoint."

Discussing production problems, Dr. Thomson explained metallurgists have some latitude in molding methods, such as die-casting, permanent mold equipment, or semi-permanent mold methods. "Ultimate economics will finally determine the molding method," he said, "but at the present time sand molding appears most uneconomical."

Commenting on the impact aluminum engines might have on the iron foundry business, Dr. Thomson pointed out that the average amount of aluminum per car since pre-World War II days has risen from 2 lb to an estimated 56 lb in 1959. But the gray iron casting business has not felt this too much because of increasing car weights.

Hex Bolts Take Over Fastening Jobs

Progress is putting the hex on one of the commonest sights in any plant: The square-headed bolt and square nut. In an important fastener industry simplification, the standard square head machine bolt with square nuts is being replaced in sizes 5/8 x 6 in. and smaller with a hexagon head and hexagon nut.

Christened "Hex & Hex" fastening by Russell, Burdsall & Ward Bolt & Nut Co., the new program is expected to obsolete square products as standard fasteners.

Talking Points — "The square nut and bolt will be extinct throughout industry by 1960 except for a few special purpose applications," predicts Harry O. McCully, RB&W senior vice-president. Consolidating in one hex bolt and hex nut the best features of four other types of fasteners should prove "a major step in fastener simplification."

Advantages to industry, according to fastener producers, are an improved quality fastener with better appearance and lighter weight. The shift to hex should permit easier and faster assembly, plus simplification of specifications and parts to be stocked.

Specific Uses — Under the new program, a hex bolt and hex nut can replace: (1) square machine bolt with rolled thread, square nut; (2) square head machine bolt with cut thread, square nut; (3) hex head machine bolt, hex nut; (4) bright cap screw with National Coarse Thread in the solid die range (generally the smaller diameters and shorter lengths), separate nut.

Because flow lines in the steel are distorted less in heading hex bolts than in manufacturing square heads, strength is greater and tolerances closer. Lamson & Sessions Co. points out that hex head bolts are already the most commonly used fasteners on farm machinery, automobiles, appliances and industrial machinery.

Industry Has Major Role in Gas Growth Forecast

	1958	1959	1960	1961	1962	1965	1970
Number of Industrial Customers	170,000	180,000	180,000	190,000	190,000	210,000	250,000
Sales to Industry (billions of therms)	46.5	48.5	50.9	53.4	55.7	64.1	81.6
Revenues, Industrial Sales (billions of dollars)	1.3	1.4	1.6	1.7	1.8	2.3	3.5
Construction Expenditures (billions of dollars)	1.7	1.6	2.2	2.3	2.5	2.7	3.6
Miles of Gas Main (thousands)	564	584	604	625	647	720	861

Source: American Gas Assn.

Rapid Growth Forecast for Gas

The nation's fifth largest industry had record sales of over $4 billion in 1957.

At AGA convention, industry's leaders predicted even greater progress in years ahead.

▪ The $20 billion gas industry is counting on becoming a $48 billion industry, in terms of gross plant value, by the year 1970.

At the American Gas Assn. convention in Atlantic City this week, 5000 industry delegates representing utility companies, pipeline companies, and appliance and equipment manufacturers laid their plans. Basic assumption is that overall gas operations, which have doubled in the past 10 years, will continue growing at that rate for at least the next 12 years.

Trend Is Up—By 1970, AGA estimates that gas sales will have increased 23 pct over 1957. The number of customers will have increased by about 30 pct, for a total of 43.8 million. Gas mains laid are expected to increase 50 pct to a total of 861,000 miles. Construction expenditures by the industry will be at the rate of $3.6 billion a year in 1970 (see table, below).

No small part of gas industry growth will be attributed to industrial demand, gas people predict. Industrial users, currently the single largest category of gas customers, are expected to consume 81.6 billion therms (one therm equals 100,000 British Thermal Units) of gas in 1970, compared to 44.4 billion last year. Residential customers, who used 16 billion therms in 1957, are expected to consume 56.5 billion therms in 1970.

Ample Reserves—Natural gas reserves have climbed from about 166 trillion cu ft to over 246 trillion cu ft since 1947. These reserves, plus significant progress in developing new techniques and sources of gas production, give the gas industry renewed confidence in its ability to provide greater service for future customers, says AGA.

A large part of the projected increased use in gas consumption will be due to new types of industrial equipment and home appliances. Many on exhibit at the Atlantic City 'Parade of Progress" exhibit represented radically new techniques in gas applications.

Industrial, Domestic Uses—They included an operating model of a new fuel cell which directly converts heat to electricity, five laboratory models of major gas air conditioning systems, gas incinerators, and top burner ovens and broiler research advances.

The new smokeless, ordorless gas incinerators, now are being mar-

keted for household use by several manufacturers. In eliminating smoke from burning refuse, the new gas appliance answers objections which had led air pollution control authorities to ban incinerators in some communities.

Other industrial innovations were:

An electronic igniter for gas equipment that operates in the infrared spectrum and is completely automatic.

Field barometric draft controls for use on flue pipes and breechings adjacent to gas fired heating and processing equipment.

Industrial ovens utilizing infrared gas burners for application of gas radiant heat to industrial processes.

A "luminous wall" industrial furnace for specialized use where rapid heating and cooling cycles are required.

Republic's Widmer On Steel Markets

The steel industry will produce about 102 million ingot tons in 1959. Quarter-by-quarter, it will look something like this: 1st—24.8 million tons; 2nd — 26.5 million tons; 3rd—23.7 million tons; 4th —27 million tons.

This is what F. R. Widmer, manager of commercial research, Republic Steel Corp., told an American Marketing Assn. group in Philadelphia last week.

Mr. Widmer also saw delivery times lengthening somewhat, but feels there is adequate capacity to avoid anything resembling the two and three months common in 1956.

He expects the FRB index to hit about 147 in 1959.

On specific industries, Mr. Widmer was particularly bullish on the potential for oil country goods. Mr. Widmer's Republic group pegs 1975 demand at 6.5 million tons, based on more drilling starts and deeper wells, compared with steel's capacity in 1957 of 3.2 million tons.

Ford Develops New Ultra-Strong Steel

▪ An "ultra-high strength" steel is reported to have been perfected by the metallurgy department of Ford Motor Co.'s Scientific Laboratory. Tensile strengths of more than 400,000 lb per sq in. have been attained experimentally, according to Dr. Michael Ference, Jr., director of the laboratory.

"These new strengths give design engineers an entirely new range in which to work," Dr. Ference said. He indicated they "well may be one of the structural materials used in tomorrow's space vehicles."

Matches Best Alloys — E. D. Marande, manager of the metallurgy dept. in the laboratory, said the new ultra-strength steels compare favorably with the best light metal aircraft alloys currently under development.

He drew a comparison between the best titanium alloys and the new structural steels. Titanium alloys, a little more than half the density of steel, now can be made with tensile strengths of 190,000/240,000 lb per sq in. "On a strength-to-weight basis, steel would require tensile strength of 340,000/430,000 lb per sq in. to equal the titanium alloys," Mr. Marande said. "These very high tensile strengths are matched by the newly developed Ford steels."

How It's Made—In essence, the process consists of plastically deforming metastable austenitic steels above the martensite temperature and then transforming them to martensite. Initial experimental studies, he indicated, were confined to steels having a modified 4340 composition but others permitting a greater degree of hardening or strengthening are being evaluated.

Steel of 4340 composition heated to above the austenitizing temperature (1550°-1600°F) and then quenched to 1000°F and held at this temperature is austenitic and remains austenitic for a period of 8 to 10 hours. Marande calls this metastable austenitic steel.

Ductile and Tough—"A remarkable feature of these new steels is the high ductility possessed by the as-quenched martensite," Mr. Marande said. "Conventional steels of similar composition in the nontempered or as-quenched condition are notoriously brittle."

Toughness of the new Ford steels is equivalent to the best ultra-high strength steels commercially available. Preliminary experiments indicate that they largely retain their excellent properties as low as liquid nitrogen temperatures, —385° F.

"Another property of great importance is that of fatigue," Marande said. "The fatigue limit of high strength steels usually is found to be about half the tensile strength. On that basis, the fatigue limit of the new Ford-developed steels should approach 200,000 lb per sq in., about a 30 pct improvement over present alloys."

Freight Car Shortage?

Shippers may be up against a freight car shortage soon, despite the sluggish pace of carloadings this year.

Upturn in business conditions will put the freight car supply under heavy strain, says Howard Freas, Interstate Commerce Commission chairman. He calls attention to estimates that a 10 pct gain in carloadings, compared to 1957, could create one of the most serious car shortages of recent years.

Yugoslavs Leave Farms for Shops

U.S. Aid Starts Country Toward Industrial Status

Our aid to Yugoslavia is an essential overseas gamble, American observers report.

The country has growing steel industry, plus good deposits of bauxite, lead, zinc, and copper. —By G. G. Carr.

■ Our gamble in Yugoslavia is paying off. The $100 million in U. S. aid in the last three years has made us good friends in this Balkan outpost in the Cold War. And American money and advice have been a major factor in the essential work of starting this predominantly agricultural country down the road to industrialization.

These are the reports of two metalworking veterans, John Dewhurst, president, Arrow Tool Works, Wethersfield, Conn., and Fred Wittner, industrial marketing, advertising and public relations expert, who heads his own agency in New York. Both men have just returned from a Commerce Dept. trade mission to Yugoslavia, where they served as consultants on production and marketing for world trade.

Favorable Odds — Their judgment: American aid to Yugoslavia is one of our most essential overseas gambles, and one with very favorable odds. They find this aid has been vital in keeping Yugoslavia independent of Russia, and has greatly helped the country to self-sufficiency.

The country still has a long way to go before it can completely stand on its own two feet. Exchange of raw materials and manufactured goods for food stuffs in world markets is an inescapable necessity if Yugoslavia is to remain independent.

Mineral Supplies—On the plus side, the U. S. visitors found, are important supplies of bauxite, lead, zinc and copper. Iron ore is available, and feeds a growing steel industry, but is high in sulphur and phosphorus. Coal is mainly lignite. Most of the country has not been properly explored for minerals, and Mr. Dewhurst believes there may well be substantial deposits in the many mountain ranges. The government is now concentrating on possible oilfields.

Lead and zinc have been major exports, mainly in slab or rolled sheet form. The U. S. has been an important market, but this is now endangered by import quotas.

Steel Production—The two industrial showplaces are the Zenica Steel Works and the Boris Kidric Aluminum Works. Zenica is by far the most important of the nation's steel plants. It will account for 750,000 metric tons of the country's total steel capacity of 1,100,000 metric tons when present expansion is completed, probably this year.

Plant blast furnace capacity is 600,000 metric tons, much of which is used for wrought iron. Steelmaking furnaces include four 60-ton stationary openhearths and four 180-ton tilting openhearths, plus two electrics, (one 3 tons, the other 1 ton). Equipment is generally good and relatively new. Much of it came from Germany's Hermann Goering Works under war reparations.

Product Range—Zenica produces semi-finished steel, rails, bars, rod, structurals and forgings, plus coal chemicals. The plant produces no flat-rolled steel, but sends semi-finished product to other plants for rolling into sheets, strip and plates.



YANKS IN ZAGREB: U. S. trade mission meets with Yugoslav businessmen. Standing is Robert C. Gordon, Time Magazine. On his left, Fred Wittner, Fred Wittner Associates; on right John Dewhurst, Arrow Tool Co.

Bomarc or Nike?

Bomarc or Nike? Which will the Pentagon's choice be for our Air defense?

The Air Force is keen on the Bomarc pilotless aircraft made by Boeing. The Army is fighting for its Nike Missile. A large share of our ground defenses are already committed to it.

The Canadian government will buy an undisclosed number of Bomarcs. It will start off with a $164 million order to equip two Bomarc squadrons.

Industry Briefs

Dana Latham, 60-year-old Los Angeles lawyer, will succeed Russell C. Harrington as Commissioner of Internal Revenue. Mr. Latham will receive a recess appointment, subject to Senate confirmation when Congress convenes in January.

Internal Revenue Service officials are advising metalworking firms oils used in hot forging and piercing operations are still exempted from the excise tax. But it will continue to apply the tax to oils used in cold forging, cutting and machining.

A new 54-in. pickling line is being installed at the Fairfield Tin Mill of U. S. Steel's Tennessee Coal & Iron Division at Birmingham, Ala. It will replace equipment installed when the tin mill was built in 1937-1938.

Panama's first steel mill, owned by the Panama Steel Co., is now turning out reinforcing bars and other smaller shapes from scrap metal secured locally. The nation's legislature has raised import duties on reinforcing steel to protect the new industry. The company expects to sell 8000 tons the first year.

Joy Mfg. Co., and Union Carbide Corp. have signed an agreement which gives Joy the right to make, use, lease and sell a remotely controlled, continuous mining system, developed by a Union Carbide division. It will be used initially to mine coal without sending men underground.

Newly elected officers of the Gray Iron Founders' Society: Albert M. Nutter, LeBaron Foundry Co., Brockton, Mass.—president; J. E. Quest, Quest Mfg. Co., Shakopee, Minn.—vice president; William A. Hepburn, John T. Hepburn, Ltd., Toronto, Canada—secretary; C. R. Garland, W. O. Larson Foundry Co., Grafton, O.—treasurer.

Building Material Tested in a Hurry



SEISMIC TESTING: To determine the resistance of building materials to such horizontal forces as high winds, earthquakes, and even bombing, an engineering task force crammed 11 seismic tests that normally take months into a week, at the R. C. Mehon Co. plant, Detroit. Under scrutiny were fabricated structural steel framing, light gage steel diaphragm roof deck and deck assemblies, with and without cured concrete.

Inco Wins Patent Suit

International Nickel Co. has won the first round in its case against the Ford Motor Co. for patent infringement.

Federal Judge Irving R. Kaufman concurred with the special master appointed to hear the case, Simon Rifkind, that Ford's use of ductile iron in making crankshafts is illegal without licensing from Inco, the patent holder.

The next step is either (1) a settlement negotiated between Ford and Inco by the special master, or (2) an appeal by Ford to a higher court.

Special Master Rifkind decided, and Judge Kaufman concurred, that damage should be computed from March 11, 1952.

The decision tightens Inco's position on ductile iron, which is being used by numerous other firms under licensing arrangements.

Bendix in Brazil

Bendix Aviation Corp. has organized a new Brazilian subsidiary to make a complete line of brake equipment for passenger cars and trucks, including air, hydraulic, and vacuum powered brakes.

Brazil has adopted a program which contemplates that by 1960 vehicles sold in Brazil must be at least 90 pct. by weight, of Brazilian manufacture.



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Dr. Clarence H. Lorig

ASM Picks a Research Scientist

Mr. Lorig, technical director of Battelle institute, is a natural for the top spot at ASM.

His life work has been closely associated with developing and improving metals.

▪ Clarence H. Lorig, new president of the American Society for Metals, got to the top in his profession by getting to the bottom of things.

Among metallurgists, he is known as a scientist with a flair for management problems — one who is more concerned with what supports an idea or a structure than the potentialities of either. His method of operating has resulted in 11 patents on alloys and metallurgical processes—and the title of Technical Director, Battelle Memorial Institute, Columbus, O.

A Hard Worker—In his quest for answers to the mysteries of metals, he has made outstanding contributions to the foundry industry and stimulated and guided a lot of research. He has been closely associated with the development of many important refractory metals including tungsten, molybdenum, titanium, zirconium, and chromium.

Dr. Lorig (he holds a Ph.D from the University of Wisconsin) is hardly what you could call a "clock-watcher." Some years ago, when he learned that industry was adopting a 40-hour week, his reaction was "Now what happens to the other 20 hours?" Only a man who enjoys his work could make such a statement.

Heavier Load Ahead—But the 40-hour week has finally come to benefit this scientist who is reluctant to leave his laboratory.



DR. C. H. LORIG: He works overtime at metallurgy.

Last year, as vice president of ASM, Mr. Lorig was handed the tough portfolio of "Building Director" of the Society's $2 million geodesic structure near Cleveland —home of the World Center for Metals. Now Mr. Lorig is inclined to believe that the 20 hours lopped off his work week will just about fit into his building director's role. The "extra time" will also have to provide for at least 44 visits to ASM chapters he already has scheduled during his term as president of the Society.

Finds His Niche—When he finished up at the University of Wisconsin, Mr. Lorig went to work, successively, for the French Battery Co., The Stowell Co., Ladish Drop Forge Co., and Pelton Steel Casting Co. He was assistant professor in mechanical engineering at Drexel Institute of Technology before coming to Battelle in 1930 as supervising metallurgist.

At Battelle, he finally found his niche, rolled up his sleeves and went to work. In the 28 years following he wrote more than 60 articles and papers which have appeared in scientific, technical, and trade journals.

Now more of his energy, his talent, and his time will go toward furthering the goals of ASM, one of the leading technical societies.

how to rustproof cold rolled steel in shipment and storage



Proved by actual test! Unwrapped steel rusted within a few hours. Identical steel wrapped in Ferro-Pak showed no signs of rust . . . even after several months. Non-toxic chemical vapors from Ferro-Pak coat the steel with an invisible film that makes it impossible for rust to get the slightest foothold.

Even under adverse conditions, such as outside storing or shipping, Ferro-Pak provides complete protection. It is waterproof, strong, yet highly flexible and easy to handle. The chemical rust inhibitor is compatible with oil and stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write Cromwell Paper Company, 4805 South Whipple Street, Chicago 32, Illinois.



How to rustproof a freight car—Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.



How to rustproof black plate—On this light gauge, dry, uncoated steel, rust can start from a fingerprint. Ferro-Pak keeps black plate rust-free even when the humidity soars!

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How Recovery Gains Momentum

Just like the recent recession, the recovery tends to "live off itself."

But a real surge like that of 1955, '56, and '57 isn't likely. There are too many real and artificial brakes.

▪ You can expect the business recovery to continue to pick up momentum for a period of at least two to three months.

Just as the recent recession "lived on itself" through inventory reduction and overall pessimism, a business recovery tends to build up momentum, possibly in excess of the rate justified by overall consumption of goods and materials.

Not Like '55—Nevertheless, it would not be wise to gamble on a surge like that of 1955-56-57. One reason is that this is not a period of expansion. Another is that the Federal Reserve Board is determined to keep money tight in its battle against inflation.

Your best bet is to base your plans on an interval of orderly recovery. It will be sustained by a lively demand for consumer durables and an adequate, but not spectacular, rate of spending for capital goods.

The Facts—Most economists believe that the recovery is based on these three factors: End of inventory cutbacks, a sustained high rate of government spending, and an improved rate of home building. Unless the tighter money market cuts into the construction business, there is no reason to question the continued upward trend.

Of course, you can't ignore the auto market and it may be too early to tell what's ahead for 1959 models. Initial reaction is that automakers may hit their prediction of 5.5 million cars.

Hold Up Their End — That would be more than holding up their end of the economy for the automakers. The suspicion still lingers that the auto industry may have to alter its course in the relatively near future, but it's far from a seriously ill industry as yet.

Furthermore, in looking at the short range picture, the automakers are still not in full swing on their 1959 models. Strikes and other problems have prevented the assembly lines from going ahead full speed.

If the fourth quarter results in an auto production rate of close to 1.5 million, the year will wind up in good shape in spite of its dismal start.

Behind GM's Local Strikes

Could Be a Lesson—For those who aren't familiar with the intimate details, the continued local strikes at General Motors, following settlement of the basic issues, is still a surprise.

However, it could be a lesson to both labor and management in that, sooner or later, local issues must be settled.

Who Started It? — It's hard to say who was more irritated by the situation, Walter Reuther or GM's management, even though both must have expected it.

Well in advance of contract negotiations, some of the more astute labor observers predicted that the wage inequities would prove to be the biggest problem at GM. And pressure came from the ranks.

Several weeks ago, one insider, referring to the so-called wage inequities, remarked that "Walter won't be able to sweep them under the carpet forever." He also predicted that GM would not change its wage structure easily.

With Hindsight — The result — crippling local strikes that prevented GM from getting into fast production on its 1959 models—could have been predicted.

As is usually the case, the great mass of "small" issues was lost in the shuffle with all emphasis placed on the major or pattern-setting issues. Both Mr. Reuther and GM would have been pleased to settle for their package and go back to work on other things for three years. But it didn't work out that way. Unfortunately, there was no easy way out other than the hard hammering out of local details.

Watch Price Trends

Keep an eye on the volatile commodities in the months ahead. As business picks up, prices are likely to fluctuate considerably.

Recent movements in the nonferrous metals are an indication. It isn't likely that metals prices will reach the inflationary stage, as they did in 1955 and 1956, but they can, and probably will, go up sharply.

It's just one of the problems that is associated with an upward trend in business. Few people ever buy on a down market and it's a problem to gage the rate and extent of a rise.

Styling Battle Coming in 1959

Ford, Chevy Take Different Tacks on New Car Designs

Chevrolets will be radically new, Ford will show some similarity to '58 models.

This growing difference in policy may be the deciding sales factor.—By H. R. Neal.

▪ Sales giants of the auto industry, Chevrolet and Ford, are about to lock bumpers in another sales year. The sales battle promises to be another no-holds-barred affair — a characteristic of their traditional competition. In recent years these two automakers have grown accustomed to manufacturing nearly 50 pct of the new cars produced in the U. S.

In 1957, after more than 20 years of trying, Ford moved ahead of Chevrolet. It won the model year production race by a comfortable margin, but lost the calendar year race by a thread. But more importantly, to Ford, it won the year's sales race.

Nip and Tuck—Ford had gone all out with a completely new product—body, sheet metal, engineering and even the wheels. Chevrolet reworked an already several-years-old automobile.

For 1958 models, however, the positions were reversed. Chevrolet offered all-new styling; Ford offered a distinctly changed but still reworked version of the previous year's model. And Chevrolet has recaptured an insurmountable lead.

Will It Last?—In the first nine months of the year Chevrolet has produced 906,415 passenger cars, for 31.5 pct of all U. S. production. In the same 1957 period the company manufactured 1,124,505 units which amounted to 24 pct of U. S. output. Ford's share has dropped to 23 pct as output dropped to 662,758 units, compared with 1,184,896 in the first nine months of last year, which was good for 25.4 pct of U. S. production.

But for the remainder of the year, the two giants will test each other on more even ground. Each has completely restyled its 1959 product.

Styling Will Tell—Ford general manager J. O. Wright may have set the tone for the coming sales and production battle when he recently stated "there have been growing differences in the styling of automobiles by major manufacturers and the competitive sales struggle for 1959 could be decided on the styling front."

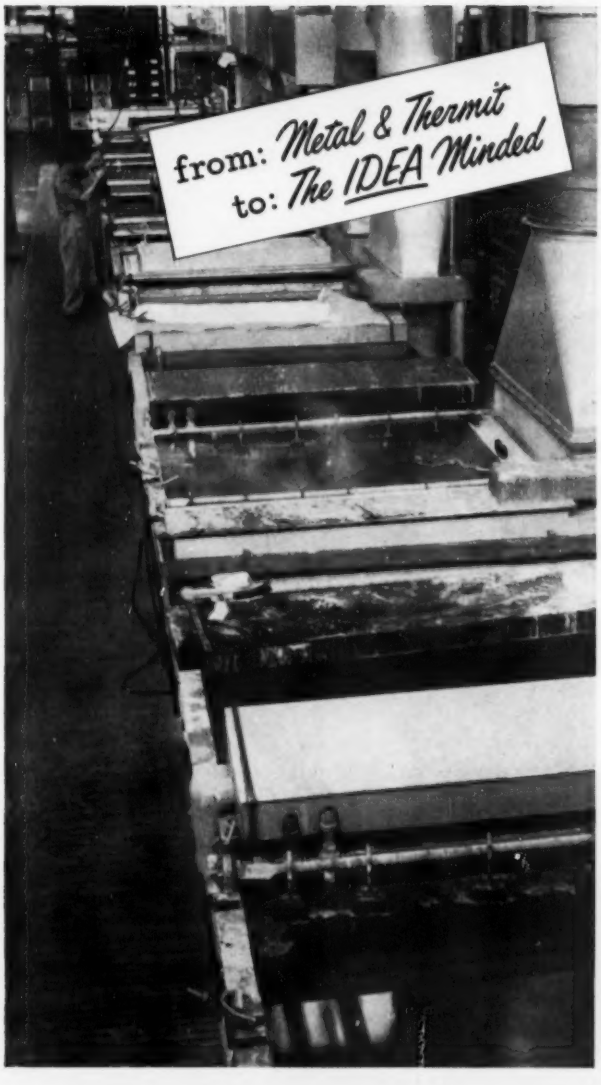
Commenting on Ford styling, Mr. Wright said, "This year we placed our bets on offering our buyers a truly fine car, a quality car with lines of classic simplicity rather than brassy ostentation." With his eyes toward Chevrolet, he accused competitors of having "moved deeper into a more bombastic kind of styling."

'Big Two' Rivals Line Up for 1959





TOUGH CHOICE: A 1959 Ford Fairlane 500 (top) attracts interest at World's Fair, Brussels, where it received a gold medal for styling elegance. At bottom is Chevrolet's Biscayne, lowest priced series in the Chevrolet line. Both cars are completely new, have more glass.



"Lifetime" protection for inaccessible tank surfaces

Shown here are a few of the more than *1000* metal finishing tanks in a well known aircraft plant that have been coated inside and out with vinyl Unichrome "Super 5300" Plastisol.

Their exteriors are coated to protect against spillage of corrosive acid and alkaline cleaning and plating solutions, especially on areas inaccessible to maintenance when the tanks are installed close together. Thus, corrosion from the outside is blocked just as effectively as the lining stops it from the inside.

Applying "Super 5300" Coating costs less than most sheet linings. Sprayed on, it conforms without seams, pores or air pockets to irregular surfaces. Send for Bulletin SP-1.



Hurricane-proof building has ALL-welded construction

The 20-story First National Bank of Miami will have its steel skeleton completely welded . . . sub-assemblies as well as field connections.

In shop fabrication and erection, the welding cuts construction time, decreases costs, fully satisfies engineering strength requirements for this hurricane area. Allied Structural Steel Company, the shop fabricator, relies on M&T's Murex electrodes for strong, dependable welds coupled with speed and economy.

Send for Bulletin ESC on the M&T line of electrodes for all welding needs.

Better chromium for the new models

Already used by one car manufacturer, a new chromium plating process promises to put an end to pitted and rusted auto brightwork. Till now, *all* decorative chromium plate contained unavoidable pores and minute cracks that permitted corrosives to attack base metal (bottom). But new Unichrome Bright Crack-Free Chromium plates without cracking, and eliminates pores by permitting up to 10 times the thickness of ordinary decorative chrome plate. Result: trim that *stays* like new (top).





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HORSE HEAD PRODUCTS

Automoitve Production

WEEK ENDING	CARS	TRUCKS
Oct. 11, 1958	33,798	11,048
Oct. 4, 1958	34,464	14,313
Oct. 12, 1957	38,626	18,560
Oct. 5, 1957	21,975	11,688
TO DATE 1958	2,927,535	628,336
TO DATE 1957	4,693,346	826,104

*Preliminary Source: Ward's Reports

Ford, in effect, has taken on Chevrolet's previously successful styling formula of "evolutionary" change. There's an unmistakable resemblance with Ford's of the past few years.

Space Age Impact—On the other hand, 1959 Chevrolet's bear no resemblance to any of its previous styling. It is described as reflecting the "influence of a space-conscious age." And in describing the styling, company publicists draw space-age word pictures: "At the rear, horizontal wings branch out from the center of the deck in a simulation of mobility that might have been conceived on the sands of Cape Canaveral."

Betting on the space age, Chevrolet general manager Edward C. Cole said his division has scheduled production of new models in the fourth quarter at one of the highest rates ever. And Ford reveals advance dealer orders for its products already total more than $1 billion at retail.

Dimensional Changes — Chevrolet bodies for 1959 are longer, lower and wider. Front seat width has been increased nearly 5 in. to 5.5 ft. Trunk capacity has been increased 20 pct to 32 cu ft. And station wagon cargo space has been lengthened to nearly 8 ft.

Sedans have been reduced in height by 1 in.; hardtop models by 2 in. Through lower body mountings and a new roof configuration, the advantage has been accomplished without sacrifice, and in some cases an actual gain in headroom.

Ford counters with 1959 line which includes 17 models ranging from the Custom 300's, which are 6 in. longer than in 1958, through the six station wagon models, the Fairlanes and Fairlane 500's. All 1959 Fords will be on a 118-in. wheelbase and will have an over-all length of 208 in.

Engineering Changes — Whether buyers prefer "Cape Canaveral" or "classic simplicity" they will find the new cars offer more than styling changes alone. Numerous engineering improvements have been made to both lines.

Easier on Gas—Gasoline economy has been improved, particularly with six-cylinder engines. Ford has actually dropped the horsepower and compression ratio of its "six," recommends use of regular grade gasoline in all of its standard engines. Lower rear axle ratios are being offered as no-cost options for those willing to trade a little performance for a little more economy.

Ford is replacing its two-speed Fordomatic transmission with a new, lighter weight automatic transmission. The new transmission has some 105 fewer parts and weighs 150 lbs—about 50 lbs less than the Fordomatic.

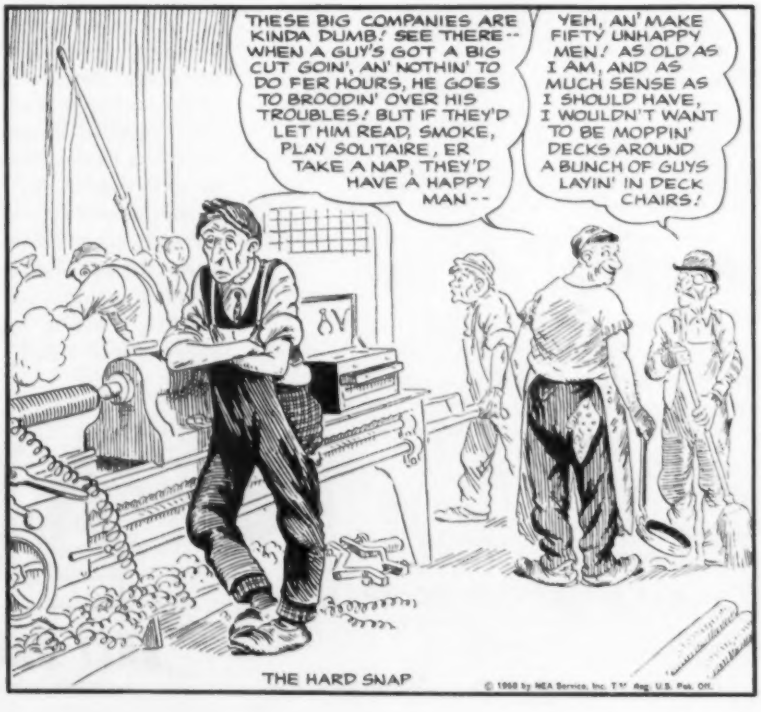
Big Advance Orders For S-P Lark

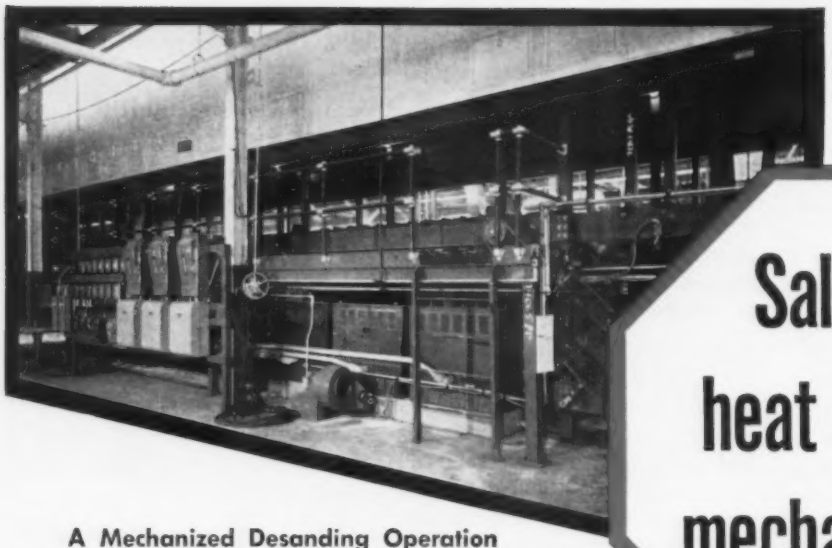
Studebaker-Packard's entry into the smaller car field, the "Lark," has drawn a strong vote of confidence from its dealers. Dealers have ordered some 25,000 cars already, exceeding the company's total production of 23,653 Studebakers and Packards for the first 9-mo. of this year, according to S-P president Harold E. Churchill.

"I can tell you that advance orders for our new cars are more than double the advance orders of dealers for our cars this time a year ago," he said.

Prospect for Profit—He also declined to predict how many of the smaller cars it would produce in 1959 or how many it would need to produce in order to start making a profit. Instead, he pointed out S-P currently has the capacity to produce 280,000 automobiles per year. Industry sources estimate the company could possibly show a profit with sales of 100,000 units.

THE BULL OF THE WOODS





Salt bath heat treating mechanization?

A Mechanized Desanding Operation

This fully automatic salt bath line for electrolytic desanding of gray iron castings was designed and supplied by Ajax. Dozens of other Ajax mechanized installations are used for hardening, carburizing, martempering, austempering, annealing and other heat treating processes.



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The chief product of Ajax is not simply the world's largest, most versatile line of salt bath furnaces. More particularly, it is an unmatched fund of accumulated experience in applying salt bath operations to best possible advantage. Nowhere is this more evident than in heat treating mechanization or automation.

In hundreds of installations, large and small, complete heat treating operations are handled automatically by conveyorized salt bath set-ups engineered from beginning to end by Ajax. From single in-line furnaces to elaborate combinations, each operation is automatically controlled and operated for maximum production economy and product quality.

When planning for heat treating mechanization, it pays to consult Ajax!

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Spending Is Finally Headed Up

It's Not Much, But the Direction Is Significant

Government figures industry will be spending at $32 billion rate before 1958 is over.

Consumer outlays may even top this.—By G. H. Baker.

▪ The long-awaited pickup in new plant and equipment spending is finally underway. The latest government figures show outlays will rise to an annual rate of close to $32 billion before the close of the year.

This is below 1957, but nicely ahead of slow pace set in the first half of this year.

Moving Up—Government planners attach great import to this upturn. Although the sum of management's plans for expansion is not exactly sensational, it is significant that the trend is now up, and not down. And, depending on how much confidence consumers show in the months ahead, the rate of rise in new orders could gather unexpected speed.

Consumer spending also is up. In fact increase here may exceed the rate of spending for capital equipment. Payrolls are up, and the buying public is becoming a little easier in its spending habits.

Factors—Appliances are making a strong comeback, due to the faster pace of homebuilding. Farm income, too, is up, helping to raise appliances sales.

Auto sales still are a big question mark. It's entirely possible that 1959 will be a 5½ to 6 million car year. The potential is there. But the vast majority of car buyers are still sitting tight. This puzzles Washington economists as much as it does Detroit management.

Outlook—To sum up: Next year is shaping up as a year of definitely better business, but clearly not a boom year. It will be months before business activity even reaches its pre-recession levels. But as long as industrial management and consumers continue to step up their planned expenditures, the picture is getting brighter, not darker. We're plainly out of the recession woods now, and the chief question is how fast will recovery continue.

No Railroads Apply

Going begging, so far, is the government offer to guarantee up to $500 million in private loans to the nation's railroads.

Congress this year passed the Transportation Act of 1958, naming the Interstate Commerce Commission as agency to guarantee loans. ICC followed up by establishing a new Section of Loans to process applications from the stricken rail lines.

But in early October the loan section was still awaiting its first application.

Hurry on Tax Decision

Small corporations have to decide before Dec. 1 whether to take advantage of new tax laws permitting them to be taxed as partnerships.

The new law passed this year will permit corporations with 10 or fewer stockholders to waive corporation income taxes on profits for 1958.

Industry in the Political Arena

Industry Interest — Businessmen are showing more interest in politics these days, as they had been asked. But now some Republicans in Congress are far from convinced that their election chances are being helped by getting swarms of voters stirred up. Fact is, quite a few Republicans will tell you, frankly, their chances are best when voting is light.

Businessmen currently are showing fresh interest in politics in several different ways. Some firms, such as Gulf Oil and General Electric, are frankly urging the voters to offset the tremendous power of labor leaders by electing officials who will act as counter-balances.

Money — But others, notably Aerojet General Corp., are expressing their political awareness by urging all workers to give $2 (or more) to the party of their choice. Many congressional experts see this program as a thinly-veiled plan to aid Democrats, and it is probably no coincidence that President Dan Kimball of Aerojet is a Democrat.

Management is likely to fare far better in politics if, like labor leaders, it campaigns on specific issues. It is a mistake simply to urge voters to vote without suggesting how they vote. An amazing number are simply uninformed. Union leaders are well aware of this shortcoming and have been very successful in thumping for issues favorable to their cause.



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West Regains Economic Health

Employment and Construction Are Rebounding

Many of the economic barometers in the Farwest are again pointing upward.

Workers are in more demand, plant expansions continue and road building improves.

Gains for electronics are expected.—By R. R. Kay.

▪ Upbeat economic news continues to cast a rosy glow on California. The proof: The Los Angeles area needs workers. Business is getting much better.

Help wanted ads are a pretty sensitive indicator of conditions. The Los Angeles Times carried 15½ pages of them in a recent Sunday issue. And in a single week, employers offered 26,000 jobs.

More Workers Wanted — Help wanted lineage doubled for the first half of this year over the same period 1957. That's quite a hike.

Industry shares in the upswing. Since January, new and expanding plants alone created over 8000 new jobs in the Los Angeles metropolitan area.

More Plant Spending—Here's the capital outlay picture, January through August, from the Los Angeles Chamber of Commerce's Industrial Dept.: Almost $104 million for expansions; $20 million for new plants.

Meanwhile, northern California shows a healthy uptrend, too. New and expanded plant facilities, January through July, totalled $271 million.

More Steel for Roads—California is going to spend $300 million on road building in the 1959-1960 fiscal year. That's a 15 pct rise over current outlays. The highway construction program will gobble up 76,000 tons of reinforcing bars and 29,000 tons of structurals. Estimated value: $25.5 million.

And More to Come—In addition here's a peek into the not too distant future. Within seven years there will be 100,000 new jobs in the southern California electronics industry. And a billion dollars more in purchases of electronic gear from the area. That's what H. J. Petersen predicts. He's executive vice president of Topp Industries, Inc., makers of electronic equipment and a magnetic tape control device for machine tool operation.

Job Gain at Boeing

Employment at Seattle's Boeing, the area's largest industrial employer, is reaching all-time highs. In August, 67,400 workers got paychecks. That's only 400 under the record set in July 1957.

The company is apparently on a hiring spree—preparing for more missile business. It's now taking on 1200 new workers a month. That puts Boeing's present employment well over the record.

Machine Tool Is Coast-to-Coast Traveler



LOS ANGELES BOUND: At a crated weight of 4800 lb this Brown & Sharpe grinder was logged in for speedy shipment from Boston to a customer in Los Angeles. American Airlines plane made the delivery.

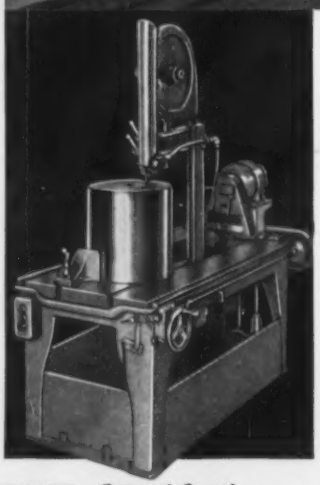
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Take the job illustrated, as an example. Three equally spaced re-entrant cuts were required to segment a large, heavy die forging. The work was merely placed on the table between the vise jaws with the first lay-out line positioned to bisect the blade. Feed pressure was set on the direct-reading scale and the cut started. On a MARVEL No. 8, the work is always stationary and the blade is fed into the work; the cutting edge of the blade is always square with the table throughout its full feed traverse, which eliminates the need for special fixtures. The pre-set Automatic Overload-Relief Power Feed kept the blade moving into the work only as fast as it could freely remove the metal; as the vertical length of the cut decreased, the blade was automatically fed faster, thus increasing cutting speed. Upon completion of a cut, the blade was rapidly returned to its starting position by a rapid traverse handwheel located at the operator's position. Succeeding cuts were made in the same manner, with the same ease and speed.



Jobs like this aren't done every day, but they serve to emphasize the versatility of the MARVEL No. 8, a truly universal metal cutting saw. If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

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Keep on Top of New Methods

It Pays to Follow up on Advancing Technology

There's no guarantee that you can get by with today's methods a couple of years hence.

Some firms are assigning key men to watching and evaluating new trends.—By E. J. Egan, Jr.

▪ Don't be too sure you'll still be making metal parts on regular machine tools and presses a couple of years from now. New fabricating techniques are cropping up so fast it's hard to keep track of them.

You should follow these developments closely, though. Who knows? Maybe chemical milling, or explosive forming, or cold extrusion can help you make a better product in less time and at a lower cost.

New Methods—Some of the new methods are akin to present machining practices in the sense that they remove metal. Chemical milling—a close tolerance etching technique for almost any metal—fits into this group. Ceramic tools and the new titanium carbides belong here also. So do such processes as electrolytic machining, electro-spark machining, and abrasive-belt grinding.

Other new methods belong to the so-called "chipless forming" category. Explosive forming of mild and alloy steels is already highly successful in many instances. So is the technique—only about three or four years old—of roll forming or power spinning. A lot of knowledge is piling up about the use of this process for hot or cold forming of thin-walled cylinders and curvilinear shapes.

Aircraft Benefits—Precision, no-draft forging is also gaining ground as a way to "move metal, not remove it." No one claims it's easy or widely applicable as yet. But it's helped the aircraft makers hurdle some tough and costly production barriers.

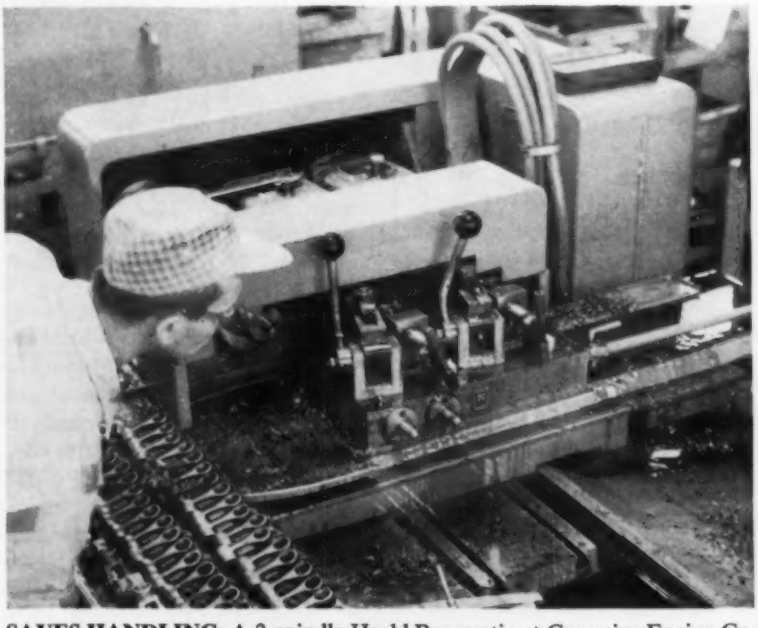
Cold extrusion, well beyond the toothpaste tube stage, is almost a whole new process in the metal forming field. Giant presses are now pushing slugs of stainless steel, titanium, molybdenum, zirconium, tantalum and other "exotic" metals into precision tubular shapes.

More Help Coming—And how about stretch forming, or new tube-bending methods that you might look into? In the same general area of forming and fabricating, how much do you know about sandwich panels, honeycomb structures, or ultrasonic welding?

Other new and fast-growing techniques embrace both the machining and metal-forming fields. Numerical control is one. As much as you think you've heard about this, it's only a drop compared to the flood that's coming.

Job For Key Man—Many firms give key men the job of following and evaluating these new methods. Competition doesn't leave much room for sentimental or blind attachment to the old ways of doing things.

One Machine Instead of Four



SAVES HANDLING: A 3-spindle Heald Borematic at Cummins Engine Co. replaces four former machines, frees two operators for other work.

INDUSTRIAL BRIEFS

Stream Degassing—As part of a $5 million program for the modernization of its melting facilities, just announced, the Midvale-Heppenstall Co., Philadelphia, has placed a contract with F. J. Stokes Corp., Philadelphia, for the construction and installation of a dual-chamber vacuum stream degassing system at Midvale's plant on Wissahickon Ave.

New Cat Cracker — The Fluor Corp., Ltd. was awarded a contract to construct an alkylation plant and an isomerization plant for Standard Oil Co. of California, Western Operations, Inc., at their Richmond, Calif., refinery. The entire facility is scheduled for completion next spring.

Atoms to Yttrium—Crane Co., Chicago, has organized a subsidiary to handle government sponsored research and development work. The newly formed Corwith Corp. is taking over and expanding government research work formerly handled by Crane's engineering division. The subsidiary is operating in facilities at the Crane Chicago Works, handles nuclear reactor and special metals.



"You can start here, Kingsley —until you become acquainted with things!"

Army Awards — The Dept. of the Army has announced the following contract awards: Western Electric Co., New York., awarded a $1.3 million contract for repair parts for the Nike-Hercules. Astra-Electronic Products, Princeton, N. J., awarded a $2.3 million contract for classified research.

Fix Your Chain?—As a salute to progressive and service-minded industry on the West Coast, the American Chain Div., American Chain & Cable Co., Inc., York, Pa., has announced installation of a Chain Service Station at their San Francisco, Calif., warehouse.

Ready to Roll — A new warehouse has just been completed by The Timken Roller Bearing Co. at its Gambrinus Plant at a cost of $275,000 and will be used for storage and distribution of specialty steel products carried in stock by the Steel & Tube Div. of the Timken Company.

Three for One—The Gates Rubber Co., Denver, is planning to spend $½ million on new warehouse and storage construction. The project includes a new 35,000-sq ft warehouse at Charlotte, N. C., a one-story warehouse at Cleveland, and a carbon black storage building at the Gates plant in Denver.

Boost for Iran—The B. F. Goodrich Co., Akron, O., has purchased from the International Cooperation Administration six investment guaranty contracts with total coverage of $16.7 million to establish a company in Iran to manufacture and sell tires and tubes.

New Lab for A-C — Allis-Chalmers Mfg. Co., Milwaukee, has completed construction of new engineering, development and research facilities in Greendale, Wis., a Milwaukee suburb. When in full operation, the Greendale laboratories will employ more than 200.

Philco Progress — An airborne radar system that produces clear, detailed ground maps from behind a protective cover of darkness, clouds or fog, has been developed by Philco Corp., Philadelphia. Philco's Government and Industrial Div. has a $2.5 million contract to build eight of these new systems for the U. S. Army Signal Supply Agency.

New Service Center — Crucible Steel Co. of America has opened its new greater Cleveland specialty steel warehouse and sales office at 31400 Aurora Blvd., Solon, O.

Aid to Education—An agricultural research program of grants-in-aid totaling nearly $20,000 will be sponsored in 1958-1959 by Climax Molybdenum Co., a division of American Metal Climax, Inc. The program includes work at six universities and two independent research foundations.

Joining The Ranks—Minneapolis-Honeywell Regulator Co. has purchased the Marion Electrical Instrument Co., Manchester, N. H. The acquisition was made through an exchange of stock, places Honeywell for the first time in the field of measuring and indicating panel meters.

For Mexican Labs—Fisher Scientific Co., Pittsburgh, has formed a new company, Fisher Scientific de Mexico, S. A., to distribute modern laboratory instruments, appliances, glassware and reagent-grade chemicals in the Republic of Mexico.

Opened For Business—Pratt & Whitney Co., Inc., West Hartford, Conn., has opened its new distribution warehouse in Cleveland. The 4,000 sq ft building was constructed adjoining the company's Sterling Die Div. plant at Cleveland to house the modern stockroom facilities. Plans will get underway for a similar installation on the West Coast.

Ornamental Iron Man—The new executive secretary of the National Ornamental Iron Manufacturers Assn. is Bob Hairston, of Memphis, Tenn.



How to breathe new life into your old presses . . .

Modernize! Replace the old, outdated features on your presses with brand new factory-engineered assemblies. New clutches, new slide adjustments, new bearings—these are only three of the 42 Bliss modernization assemblies you can add right in your own plant, keeping downtime and outside costs to a minimum. You can add important new press features to your old press at a fraction of the cost of a new press!

When modernizing won't do the job . . . consider *rebuilding*. We've rebuilt presses 20 years old and older—*restored them to their original efficiency!* We replace and refit all wearing surfaces . . . replace worn and outdated parts . . . put your press back together to its original tolerances. And we *guarantee* it.

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F. G. Benford, appointed manager, Brackenridge (Pa.) Works, Allegheny Ludlum Steel Corp., Pittsburgh.

Correction—In last week's issue it was incorrectly stated that **J. R. Fox** had been appointed vice president, Aluminum Co. of America. He actually was named general manager, Refining Div.

C. D. Scribner, named vice president, personnel, Vickers Inc., Div. of Sperry Rand Corp.

Robert Linville, appointed vice president, marketing, Kenco Mfg. Co., Los Angeles.

G. B. Slebos, appointed asst. to the vice president and treasurer, United Air Lines, Chicago.

W. J. Beauchamp, appointed treasurer and **K. J. Battjes,** named secretary, The George L. Nankervis Co., Detroit.

T. L. Thomas, III, appointed vice president, General Smelting Co., Philadelphia.

J. C. H. Larsen, appointed vice president, sales, The Adalet Mfg. Co., Cleveland.

Alexander Black, named vice president, sales, Rheen Mfg. Co.'s Defense and Technical Products Div.

H. D. Feltenstein, Jr., named executive vice president and general manager, Lithium Corp., Minneapolis.

R. O. Hallberg, promoted to vice president, operations, The Wilbur B. Driver Co., Newark, N. J.

E. H. Stricker, promoted to Louisville district sales manager, Jones & Laughlin Steel Corp., Pittsburgh.

E. G. Painter, appointed coordinator, production control, Allegheny Ludlum Steel Corp., Pittsburgh.



J. C. Moroso, appointed general product manager, Electro Metallurgical Co., Div. of Union Carbide Corp.

F. F. Malcher, named head, New Product and Technical Service Div., Research Center, Republic Steel Corp.

C. A. Tarter, appointed superintendent, tin mill, Kaiser Steel Corp.'s Fontana, Calif., plant; **W. B. Keirn,** named consultant for the tin mill.

L. C. Black, appointed manager, domestic sales, Bucyrus-Erie Co., S. Milwaukee.

J. H. Richardson, appointed manager, Product Development Dept., Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

Clare Engle, appointed superin-



William Wraith, Jr., named metallurgical manager, The Anaconda Co., New York.



T. K. Graham, named asst. metallurgical manager, The Anaconda Co., New York.



W. R. Yingst, appointed manager, West Leechburg (Pa.) Works, Allegheny Ludlum Steel Corp.

tendent, manufacturing, Hydreco Div., The New York Air Brake Co., Kalamazoo, Mich.; **George Diggles,** appointed manager, production engineering.

Wilfred Turbeville, appointed asst. manager, foil sales, Aluminum Co. of America, Pittsburgh.



L. F. Fontana, appointed vice president and general sales manager, Irving Subway Grating Co., Inc., Long Island City, N. Y.

Dr. E. B. Gunyou, appointed chief of operations, Atomic Energy Engineering Dept., Alco Products, Inc., Schenectady, N. Y.



J. S. Smart, Jr., appointed general sales manager, American Smelting & Refining Co.

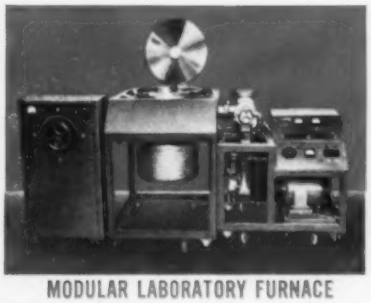
D. M. Diltz, appointed asst. to the vice president, sales, American Metal Products Co., Detroit.

Colonel J. N. Dick, appointed Washington representative and dis-

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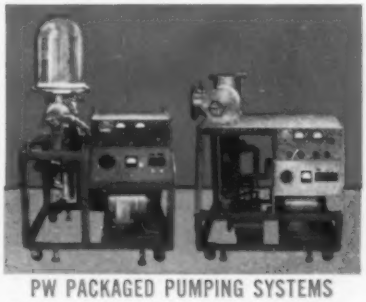
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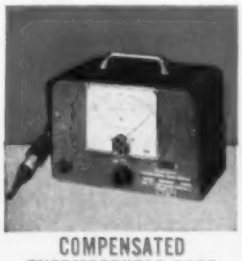
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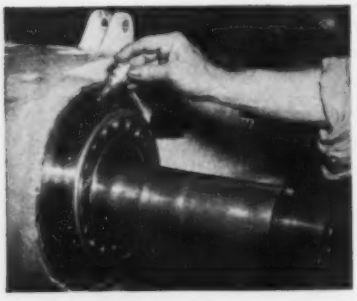
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trict manager, Washington, D. C., office, Allegheny Ludlum Steel Corp., Pittsburgh.

R. F. Meyers, appointed asst. plant manager, operations, Bay Manufacturing Div., The Electric Auto-Lite Co.'s General Products Group.



H. W. Beck, appointed general manager, Pittsburgh plant, Joseph T. Ryerson & Son, Inc.

H. J. Arnold, appointed asst. product manager, stainless bar, wire and billet products, and **T. G. Davis,** as asst. product manager, flat rolled stainless products, Crucible Steel Co. of America, Pittsburgh.

G. C. Watterworth, appointed manager, traffic and **G. J. McGarry,** appointed asst. traffic manager, The International Nickel Co., Inc., New York.

A. R. Fraser, appointed director, metallurgical sales and services, American Chrome Co., Nye, Montana.

F. T. Hahn, appointed manager, Rochester sales office, F. J. Stokes Corp., Philadelphia.

C. J. Middleton, appointed regional manager, Pacific Northwest, United Air Lines, Seattle, Wash., headquarters.

A. J. Faranda, appointed asst. manager, architectural sales, New York headquarters, Aluminum Co. of America.

W. W. Wellborn, appointed technical director, Carbide Div., Firth Sterling Inc.

E. A. Venstrom, appointed metropolitan New York district manager, Industrial Products Div., Warner Electric Brake & Clutch Co., Beloit, Wis.; **R. W. Vierck,** appointed Chicago district manager.

Andrew Syska, named research engineer, C. I. Hayes, Inc., Cranston, R. I.

R. H. Tesreau, Jr., appointed industrial engineer, Pittsburgh Steamship Div., U. S. Steel Corp., Cleveland.

E. R. Arnold, named technical service representative, Defense Products Dept., Callery Chemical Co., Pittsburgh.

Dr. J. A. Anthes, named asst. director, research and development, Dravo Corp., Pittsburgh.



Robert Hughes, appointed director, research and development, Dravo Corp., Pittsburgh.

Jess Moore, appointed special factory representative, Atkins Saw Div., Borg-Warner Corp., Indianapolis.

OBITUARIES

D. E. Griesemer, 55, manager, The Babcock & Wilcox Co.'s Office Management Dept.

C. H. Keen, veteran sales executive, Hubbard & Co.

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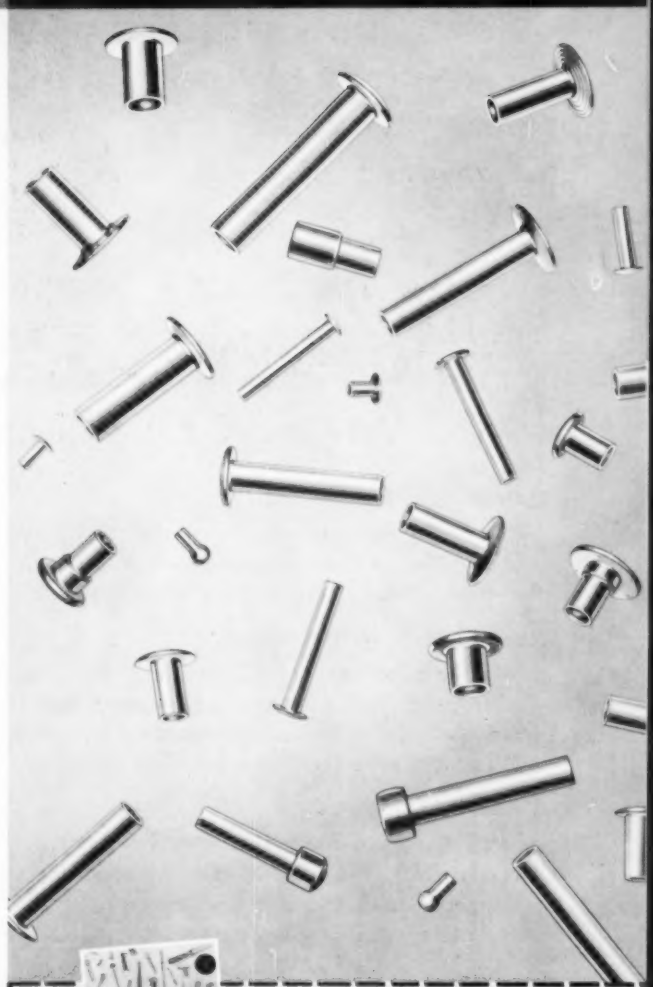
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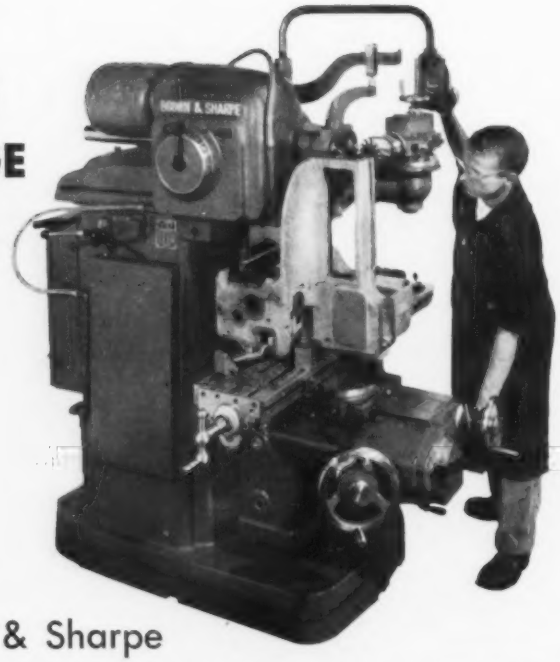
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Universal & Plain Milling Machines — sliding head type

LOWER ORIGINAL INVESTMENT

On the RANGEMASTER you can take No. 2 size cuts on work pieces whose physical dimensions would normally require the capacity of a more expensive No. 3 or larger size machine.

LOWER SET-UP AND OPERATION COSTS

With the RANGEMASTER you *clamp the work piece once*, then machine all around it — mill, drill, or bore from any angle. You avoid relocating and re-alignment, with consequent risk of errors. You get more hours of machining time, and minimize set-up time.

LOWER TOOLING COSTS

In the RANGEMASTER, both horizontal and vertical spindles have the same standard No. 40 M.M. taper for interchangeability of tooling. One set of tooling serves for multiple operations. There's no need for costly compounding of tool inventory.

Compare all the features of the RANGEMASTER, Universal or Plain Type, and you'll agree it's by far your best buy in its class. For details, write: Brown & Sharpe Mfg. Co., Providence 1, R. I.

ALL THE ADVANTAGES OF A "RAM-TYPE" MACHINE WITH NO SACRIFICE IN CUTTING ABILITY

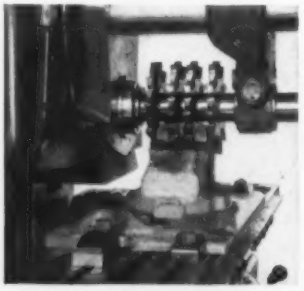
In the Rangemaster, all the following features are the same as in a conventional knee-type milling machine of corresponding size:

SAME SPINDLE MOUNTING –

SAME SIZE "BULL" GEAR –

SAME RANGE AND NUMBER OF SPINDLE SPEEDS –

SAME DIRECT DRIVE to both spindles, utilizing full power

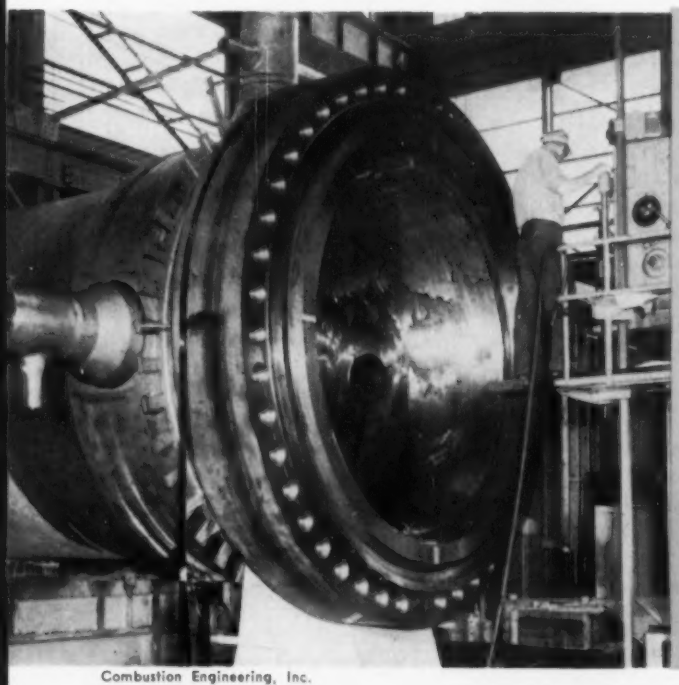


Positioning of sliding head adjacent to the work piece permits mounting of cutters close to spindle nose for improved cutting ability.

PROGRESS IN PRECISION FOR 125 YEARS

Brown & Sharpe BS

MILLING, GRINDING, AND SCREW MACHINES • MACHINE TOOL ACCESSORIES • PRECISION TOOLS • HYDRAULIC PRODUCTS • CUTTERS



Combustion Engineering, Inc.

How To Get More For Your Metalworking Dollar

Special Ferrous Alloys

IN THIS FEATURE

They may not lead in tons produced, but special alloys are as indispensible as the major structural irons and steels.

These materials can best be classified according to the industrial jobs they are intended to handle.

Some are heat-resistant. They can retain a high degree of strength at elevated temperatures up to 2000°F. Many of these same alloys stand up well under conditions of extreme thermal shock.

Other alloys resist corrosion and chemical contamination — acid, alkaline, oxidizing, reducing. These are vital to the chemical, food processing, and petroleum industries.

Still other alloys resist abrasive wear, provide springs with strength and elasticity, act as permanent magnets, or serve as core materials for transformers and motors.

This feature covers eight major kinds of special ferrous alloys. All are important to industry; some are vital to metalworking.

Sturdy Steels for Springs

The performance of a spring is tied to its design and the quality of the steel from which it is made.

Check these pointers on spring steels and how they can be applied most effectively.

■ The making of spring steel is a highly developed specialty. This is not readily apparent from a consideration of the chemistry of spring steels alone. Actually, the chemical analyses of most spring steels indicates nothing more or less than a conventional plain carbon steel.

But this apparent simplicity is misleading. For it is the quality that is "built in" to a spring steel, over and above its chemistry, that determines its performance. With this in mind, it is obvious that not just any high carbon grade of strip or wire is likely to be suitable for springs.

Stiff Requirements—What qualities must go into the making of a satisfactory spring steel? According to Associated Spring Corp., a leading manufacturer in the field, spring steels must possess "accuracy, ductility, hardenability, finish, high fatigue value, and uniformity in response to forming and heat treatment from one lot to another."

"Accuracy" means a uniformity of thickness that is held to much closer tolerance than is normally required in conventional cold rolling. Such uniformity can only be obtained by careful control of the hot-rolled strip, special annealing during cold rolling, and holding close tolerances on all mill and roll equipment.

Need Ductility — Good ductility must be inherent in the parent material. The steel must start with proper carbide size and distribution. The amount and distribution of ferrite must also be controlled. To some extent, these inherent qualities may be enhanced by both annealing and rolling practice.

As for hardenability, the original melting practice of the steel determines whether it will be a shallow-hardening fine-grained steel, or a deep - hardening coarse - grained grade. Fine-grained steels are tough and ideal for thinner sizes where depth of hardenability is not a problem. Heavier sizes usually require a coarse-grained steel.

Guard Surface—The final finish on a spring steel depends on both hot and cold rolling practice. All hot-rolled bands must be properly cleaned and annealed under conditions that will not oxidize or decarburize the surface. Because springs are characteristically subjected to high surface stresses, a satisfactory surface finish is mandatory.

The fatigue properties of spring steels are determined by a number of factors. Basic steel quality is very important. The presence of either internal or external stress raisers will cause a spring to fail prematurely. This means that the external surface of the steel must

Table 1 | Standard Thickness Tolerances*

Specified Thickness, in.	Width, in. ½ and Under	Over ½ and Less than 1	1 to Under 3	3 to 6	Over 6 to 9
0.188–0.250	0.002	0.002	0.0035	0.004	0.0045
0.161–0.187	0.002	0.002	0.0035	0.004	0.0045
0.126–0.160	0.002	0.002	0.003	0.0035	0.004
0.100–0.125	0.002	0.002	0.003	0.0035	0.004
0.084–0.099	0.002	0.002	0.003	0.003	0.0035
0.069–0.083	0.002	0.002	0.003	0.003	0.0035
0.050–0.068	0.0015	0.002	0.0025	0.003	0.003
0.040–0.049	0.0015	0.002	0.0025	0.0025	0.003
0.035–0.039	0.0015	0.002	0.0025	0.0025	0.003
0.032–0.034	0.0015	0.0015	0.002	0.002	0.003
0.029–0.031	0.0015	0.0015	0.0015	0.002	0.003
0.026–0.028	0.001	0.0015	0.0015	0.002	0.0025
0.023–0.025	0.001	0.001	0.0015	0.002	0.002
0.020–0.022	0.001	0.001	0.0015	0.002	0.002
0.017–0.019	0.001	0.001	0.001	0.0015	0.002
0.014–0.016	0.001	0.001	0.001	0.0015	0.002
0.012–0.013	0.001	0.001	0.001	0.001	0.0015
0.010–0.011	0.001	0.001	0.001	0.001	0.0015
0.008–0.009	0.00075	0.00075	0.00075	0.00075	0.001
0.005–0.007	0.0005	0.0005	0.0005	0.00075	

* Plus or minus variation allowed, including crown. Measure thickness ⅜ in. from edge on 1 in. or wider, and anywhere between edges on narrower strip.

be uniform and free of imperfections. Internally, the steel must be free of pipes and laminations, large inclusions, and excessive banding. Its metallurgical structure must be homogeneous.

Five Types—For most engineering applications, there are five types of plain carbon spring steel. These differ primarily in carbon and manganese content. The grade with the highest carbon content (1.25-1.32 pct) is low in manganese (0.10-0.25 pct). At this carbon level, ductility is comparatively low and final hardening is normally handled after fabrication. This grade is used for making band saws, cutlery, scraper blades, and a variety of abrasion-resisting parts.

A grade known as "clock spring" steel contains 0.90 to 1.05 pct C and 0.30 to 0.50 pct Mn. Comparable to 1095 steel, it is used mostly in light gages as pretempered strip. Where forming requires it, this grade may be supplied in the annealed condition. After hardening and tempering, it has very high elastic limit and fatigue values.

Broad Application — A general purpose spring steel (0.70-0.80 pct C; 0.50-0.80 pct Mn) is widely used for many types of small springs. It is very ductile and formable in the annealed condition. Tempered, it is both tough and elastic. Typical uses include automobile clutch springs, fastening devices, typewriter parts, putty knives, and loose-leaf book-back springs.

At lower carbon levels, two other spring steel grades are available. Because of their lower carbon content, these steels are recommended for applications requiring extreme forming. As a general rule, they are more suitable for use at lower stress levels.

Use Alloy—Where critical stress levels are involved, a number of alloy spring steels can be depended upon to perform satisfactorily. Among the more common alloy combinations are the chrome-vanadium, silicon-manganese, chrome-silicon, chrome-molybdenum, and chrome-molybdenum-nickel grades. The chrome-vanadium types, for example, are intended for ultra-high stress conditions where fatigue strength is a critical factor. These alloys are excellent for shock and impact loading and can operate at temperatures up to 425°F. They're used for aircraft valve springs.

When ordering spring steels, here are some of the essential details that should be spelled out in your order: The quantity desired should be noted in pounds. Width and thickness should be indicated in inches, not gage numbers.

Check Details—Always make it clear whether coils or straight lengths are required. Straight lengths will cost you more. Restrictions on coil dimensions will also involve paying an extra.

Make sure that the specific grade of steel or its chemical analysis is included in your order. Also mention condition of heat treatment. If you are ordering tempered stock, be sure to indicate the Rockwell hardness required. Edge requirements should also be spelled out.

Table 2 | Width Tolerances for Special Edges

Edge No.	Specified width, in.	Thickness, in.	Width variation, in. ±
1	Over ½ to ¾	3/32 and thinner	0.005
1	Over ¾ to 5	⅛ and thinner	0.005
4	Over ½ to 1	3/16 to 0.025	0.015
4	Over 1 to 2	0.2499 to 0.025	0.025
4	Over 2 to 4	0.2499 to 0.035	3/64
4	Over 4 to 6	0.2499 to 0.047	3/64
5	Over ½ to ¾	3/32 and thinner	0.005
5	Over ¾ to 5	⅛ and thinner	0.005
5	Over 5 to 9	⅛ to 0.008	0.010
5	Over 9 to 20	0.105 to 0.015	0.010
5	Over 20 to 23 15/16	0.080 to 0.023	0.015
6	Over ½ to 15/16	3/16 to 0.025	1/64
6	Over 15/16 to 2	0.2499 to 0.025	1/32
6	Over 2 to 6	0.2499 to 0.025	3/64

Courtesy Associated Spring Corp.

Table 3 | Width Tolerances for Slit Edges

Specified Thickness, in.		Width, in.				
Over	To and including	Over ½ to 6	Over 6 to 9	Over 9 to 12	Over 12 to 20	Over 20 to 23 15/16
		Variations from Specified Width, in. ±				
0.160	0.2499	0.016	0.020	0.020	0.031	0.031
0.099	0.160	0.010	0.016	0.016	0.020	0.020
0.068	0.099	0.008	0.010	0.010	0.016	0.020
0.016	0.068	0.005	0.005	0.010	0.016	0.020
Up to	0.016	0.005	0.005	0.010	0.016	0.020

Courtesy Associated Spring Corp.

Silicon Steels For Cores

The most common electrical core materials are silicon sheet steels. But they're not all alike.

Differences in silicon content will affect their performance. So choose them with care.

▪ The bulk of all electrical cores for transformers, electric motors and generators are made of silicon steel electrical sheet materials.

In their final form, electrical cores consist of thin laminations insulated from each other. They are efficient because they greatly reduce the amount of electrical energy lost as heat. Above all, silicon steels are used because they have three special electrical properties: high permeability, high electrical resistance, and low hysteresis loss.

Major Types—There are three principal families of silicon steels, classified primarily according to silicon content. Low silicon steels (0.5-1.5 pct Si) find application in rotors and stators of motors and generators. At the 1-pct silicon level, these steels are also used for reactors, relays, and small intermittent-duty transformers.

Containing from 2.5 to 3.5 pct Si, the medium silicon steels are recommended for use in motors and generators of average to high efficiency. They are also suitable for small to medium-sized, intermittent-duty transformers, reactors, and motors.

For Power and Radio — Steels with the highest silicon contents (3.75-5.0 pct) are designed for power and radio transformers, highest efficiency motors and generators, and other communications equipment components. At the 5-pct Si level, these materials are quite hard and brittle.

According to the experts, three factors have the most important effects upon the magnetic properties of silicon steel electrical sheets. These factors are: (1) chemical composition, (2) internal stress, and (3) grain orientation. As for chemical composition, silicon is a beneficial addition to iron. Almost all other elements affect magnetic properties adversely. Carbon, sulphur, oxygen, and nitrogen are especially harmful. Consequently, as many as possible of these elements must be eliminated through the melting practice.

Avoid Stresses—The presence of internal stress in electrical sheet will hurt such magnetic properties as permeability, coercive force, and hysteresis loss. For this reason, every effort is made to produce a stress-free product. The mechanical stresses that result from rolling are relieved by careful annealing and very slow cooling from the annealing temperature.

The orientation of individual metal crystals in the sheet have a marked effect upon magnetic properties. This directionality effect is particularly apparent in grain-orientated sheet.

What About Orientation?—It is not always desirable, however. In applications involving rotating machinery, for example, it would be a disadvantage. On the other hand, it is a valuable property in the cores of distribution and power transformers.

Allegheny Ludlum's experts have compared grain orientation with the "cause of a piece of wood splitting easily with the grain and not across the grain." The answer "lies in the manner in which the individual particles making up the wood are arranged. With the greater portion of grains or crystals arranged in the direction of rolling, magnetic properties usually improve from 10 to 15 pct."

There is little likelihood of an application calling for the extensive forming or drawing of electrical sheets. Still, these materials must be capable of being punched and sheared. They must also be reasonably flat.

In making cores, it is essential that each lamination be properly insulated from the others. This sharply reduces the flow of eddy currents between laminations and increases efficiency.

As a rule, the insulation used for this purpose is either an organic or inorganic varnish known as a core plate. The varnish can be applied to the laminations by coated rollers. In oil immersed transformer cores, the varnish must not contaminate or combine chemically with the oil.

Use Core Plates—After coating, the sheets or laminations are flashed and oven baked. The thickness of the coating is not arbitrary and must be controlled in terms of desired electrical properties.

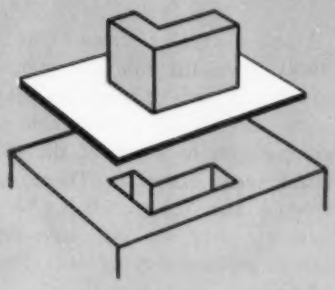
Obviously, the heavier coatings tend to increase insulating properties. According to U. S. Steel Corp., the coating cannot be too thick "because this will in effect reduce the amount of steel in a core of a specific height."

Along with variations in coating thickness, baking temperatures will also differ—depending primarily on the chemistry of the coating used. More care is normally required in baking organic varnishes. To free these coatings of tackiness, it is necessary to volatilize most of the vehicle. In addition to being sticky to the touch, under-baked laminations will not have satisfactory insulating properties.

Inorganic core plates are virtually free of volatile oils and organic matter. They will withstand annealing temperatures up to about 1500°F and permit annealing laminations before assembling the core.

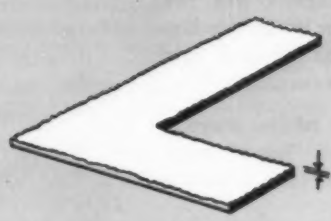
Allegheny Ludlum Steel Co.

Tips On Processing Thin Laminations



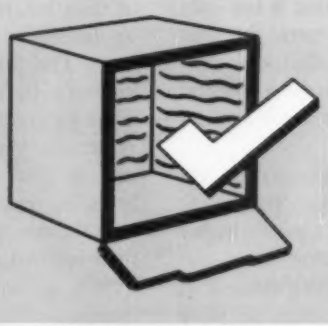
1. CUT CLEANLY AND ACCURATELY TO SIZE AND SHAPE

2. MINIMIZE BURR

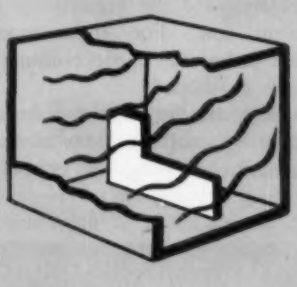




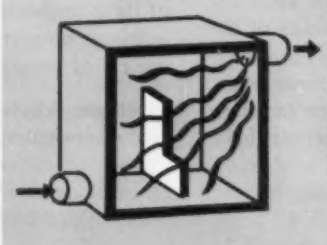
3. REMOVE OIL BEFORE FINAL ANNEAL



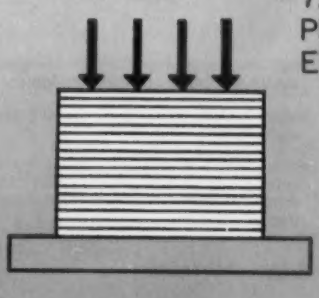
4. ANNEAL AFTER STAMPING TO ELIMINATE STRAINS



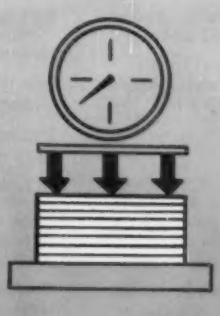
5. PROTECT DURING ANNEALING FROM EXCESSIVE OXIDATION



6. CONTINUOUS FLOW OF PROTECTIVE ATMOSPHERE SHOULD BE MAINTAINED



7. DISTRIBUTE PRESSURE EVENLY



8. KEEP PRESSURE AS LOW AS POSSIBLE

Magnetic Core Materials

Magnetic materials are the heart of most electrical machinery. They can be divided into two separate classes.

Here are some of the ways in which "soft" and "hard" magnetic alloys may be properly applied.

▪ If we think of a simple electrical machine reduced to its basic elements, we conclude that it has only three indispensible parts. It must have an insulated electrical conductor capable of carrying current. In most cases, this is some form of copper.

Next, it must have some kind of magnetic core material. This might be a simple piece of iron or a highly complex magnetic alloy. Last, our machine must have some element of control—a simple switch or more elaborate electronic circuit.

Key Material — The magnetic core is often the heart of electrical machinery. At the beginning of the century, iron was the only magnetic core material in use. Since then, requirements have become far more exacting and core materials have grown in number and versatility to fill special needs.

It is the job of the designer to decide what magnetic properties are required for his core application. The manufacturer then proceeds to make the required material to specification.

Soft or Hard — There are two separate classes of magnetic materials. They are distinct by virtue of their inherent properties and the applications for which they are used. The first group is known as magnetically soft materials. Placed in an external magnetic field, these materials become strongly magnetized. But as soon as external force is removed, these materials lose their magnetism and return to their original condition.

Not so with magnetically hard materials — the second important group. Even after an applied magnetic field is completely removed, these materials retain some portion of their magnetism. Because of this unusual property, such materials are called permanent magnets.

Silicon Alloys—Simplest of the soft core materials is iron. Until 1900, it was the only core material in use. Later, silicon-iron alloys were developed, comparable in composition to some of the electrical sheet materials. These may contain from 0.5 to 5.0 pct Si. In general, they do not have the initial permeability of nickel-iron alloys.

The nickel-iron alloys, many of which are proprietary materials, contain from 35 pct to 90 pct Ni. When properly heat treated, they develop high initial permeability and low hysteresis loss. Many of them are known as Permalloys. They are adversely affected by impurities such as sulphur, carbon, oxygen and nitrogen.

Modified Grades — The high initial permeability values of nickel-iron alloys at the 78-pct Ni level has two serious disadvantages. The heat treatment of the material is highly critical, and the electrical resistivity of the material is relatively low. For these reasons, modified grades of nickel-iron alloys were developed.

Both disadvantages can be overcome by small additions of molybdenum, chromium, and copper. As

Table 1 | Silicon Steels

Description	Special Properties	Typical Uses
Grain oriented 3.25 pct Si strip. Comes coils and laminations 0.012 and 0.014 in. thick.	Very low 60 cps core losses, high permeability, and low exciting currents at high inductions.	Power and distribution transformers.
Grain oriented 3.25 pct Si strip. Available in coils 1, 2, and 4 mils thick.	Low core loss and high permeability at frequencies greater than 60 cps.	High frequency transformers, magnetic amplifiers, communication equipment.
Non-oriented, 3.25 pct Si strip sold at 0.067 in. only.	Maximum of 8.0 watts per lb at 10,000 gausses and 400 cps.	Selsyn motors, rotating equipment operating at high frequencies.
1.5 to 4.5 pct Si, balance Fe. Highest silicons available only as hot rolled product. Other grades available in sheet, strip and laminations.	60 cycle watt losses consistent with AISI grade designations. Ductility decreases with increasing silicon content. Audio grades have superior permeability characteristics at low flux densities.	Rotors and stators of ac and dc motors, small power transformers, current transformers, series transformers, audio transformers.
1.5 and 2.75 pct Si. Available in rounds, squares, bars, flats, strip.	Hysteresis and permeability characteristics suitable for use in relays.	Relays, electromagnets.

Table 2 | Iron Nickel Alloys

Description	Special Properties	Typical Uses
48 pct Ni, bal. Fe.	High initial permeability and high maximum permeability at intermediate inductions developed after a high temperature, hydrogen anneal.	Audio transformers, relays, instruments, communication equipment.
4750 modified with Mo and Si to increase resistivity.	Low core loss at high frequencies. High initial and maximum permeabilities at intermediate inductions developed after a high temperature, hydrogen anneal.	Pulse transformers and other special high frequency equipment.
Grain oriented, 50 pct Ni, bal. Fe	Low coercive force and rectangular hysteresis loop developed after a high temperature, hydrogen anneal.	Magnetic amplifiers, computers, mechanical rectifiers, saturable reactors.
78 pct Ni + Cu and Cr, bal. Fe.	Relatively low saturation. Very high initial and maximum permeabilities developed after a high temperature, hydrogen anneal.	Shields, communication equipment, transformers, saturable reactors.
79 pct Ni + 4 pct Mo, bal. Fe.	Relatively low saturation. Very high initial and maximum permeabilities developed after a high temperature, hydrogen anneal. Very good properties at very low inductions.	Same as Mumetal.
79 pct Ni plus 5 pct Mo, bal. Fe.	Extremely high initial and maximum permeabilities developed after a high temperature, hydrogen anneal.	Special communication equipment.

Courtesy Allegheny Ludlum Steel Corp.

Table 3 | Other Magnetic and Special Alloys

Description	Special Properties	Typical Uses
50 pct Co + 2 pct V, bal. Fe	Very high saturation and high magnetostriction.	High density application. Ultrasonic transducers.
7 pct Ni, 11 pct Mn, bal. Fe.	A nonmagnetic, high strength steel.	For mountings in power transformers and on high current bus boards in power generating stations and substations.
12 pct Cr, 4.25 pct Al, bal. Fe.	Very high electrical resistance.	Resistor grids for motor controls.
28 pct Cr, bal. Fe. 48 pct Ni, bal. Fe. 42 pct Ni, bal. Fe. 42 pct Ni, 6 pct Cr, bal. Fe.	Coefficient of thermal expansion the same as certain glasses.	Glass-to-metal seals.

Courtesy Allegheny Ludlum Steel Corp.

little as 4 pct Mo will simplify heat treatment and significantly increase resistivity. Alloys of iron and cobalt—with or without a third element such as vanadium — also find wide electrical application.

Permanent Magnets—In the field of permanent magnets, there are virtually hundreds of commercial and experimental materials. Most of them can be classified in six major groups. The first group consists of high-carbon steel containing small amounts of chromium or tungsten. A second group of relatively complex materials contains high percentages of cobalt, molybdenum and tungsten with minor additions of other elements.

Aluminum-nickel-cobalt-iron alloys form a third group of permanent magnet materials. These have wide application and are known as Alnico alloys. The three remaining groups are: (1) copper-nickel-cobalt alloys with or without iron, (2) silver-manganese-aluminum alloys, and (3) cobalt-vanadium-iron alloys. This last group bear the trade name Vicalloy.

How They're Used—In terms of application, alloys of high initial permeability are used for communication circuit transformers transmitting a wide band of frequencies and highly accurate current transformers. They may also be used as magnetic shields for such components as cathode ray tubes.

Alloys whose prime characteristic is constant initial permeability also have low hysteresis loss. They are used where a constant inductance must be maintained at a given current level. An alloy typical of this group contains 45 pct Ni, 25 pct Co, 22 pct Fe, 7.5 pct Mo, and 0.5 pct Mn.

Small transformers at audio frequencies, chokes, and pole-pieces in magnetic circuits usually require alloys of high magnetic saturation. The Permalloys are included in this group. A typical alloy contains about 54 pct Fe, 45 pct Ni, and less than 1 pct Mn.

High-frequency generator components, some inductance coils, and pulse transformers may need alloys that have very high resistivity. Here, again, the iron-nickel-manganese alloys can be used for satisfactory electrical performance.

Cast Alloys Resist Heat

Some of these cast alloys will stand up well at 1500°F. Others will operate satisfactorily up to 2000°F.

Make sure you choose the right alloy in terms of both temperature and operating conditions.

▪ A wide selection of nickel-chrome cast alloys are designed to operate at temperatures above 900°F. Known as heat-resistant castings, they are identified by standard designations proposed by the Alloy Casting Institute.

According to the A.C.I. system, heat-resistant cast alloys are identified by the letter H followed by another letter in alphabetical order from B to X. HB alloy contains the least nickel (about 8 pct). HX alloy contains the most (67 pct). As a general rule, the alloys with higher nickel contents are intended for more severe operating conditions.

Hot Strength—These alloys are used in many furnace applications to provide considerable strength at elevated temperatures. In addition to service in heat treating, oil-refinery, and cement-mill furnaces, they find use in power plant equipment and gas turbine parts.

Three grades are essentially iron-chromium alloys—types HB, HC, and HD. High chromium content provides them with excellent oxidation resistance at temperatures of 1500°F and above. With the possible exception of nickel-containing HD, these alloys have limited high-temperature strength and should be used only when low static loads are involved.

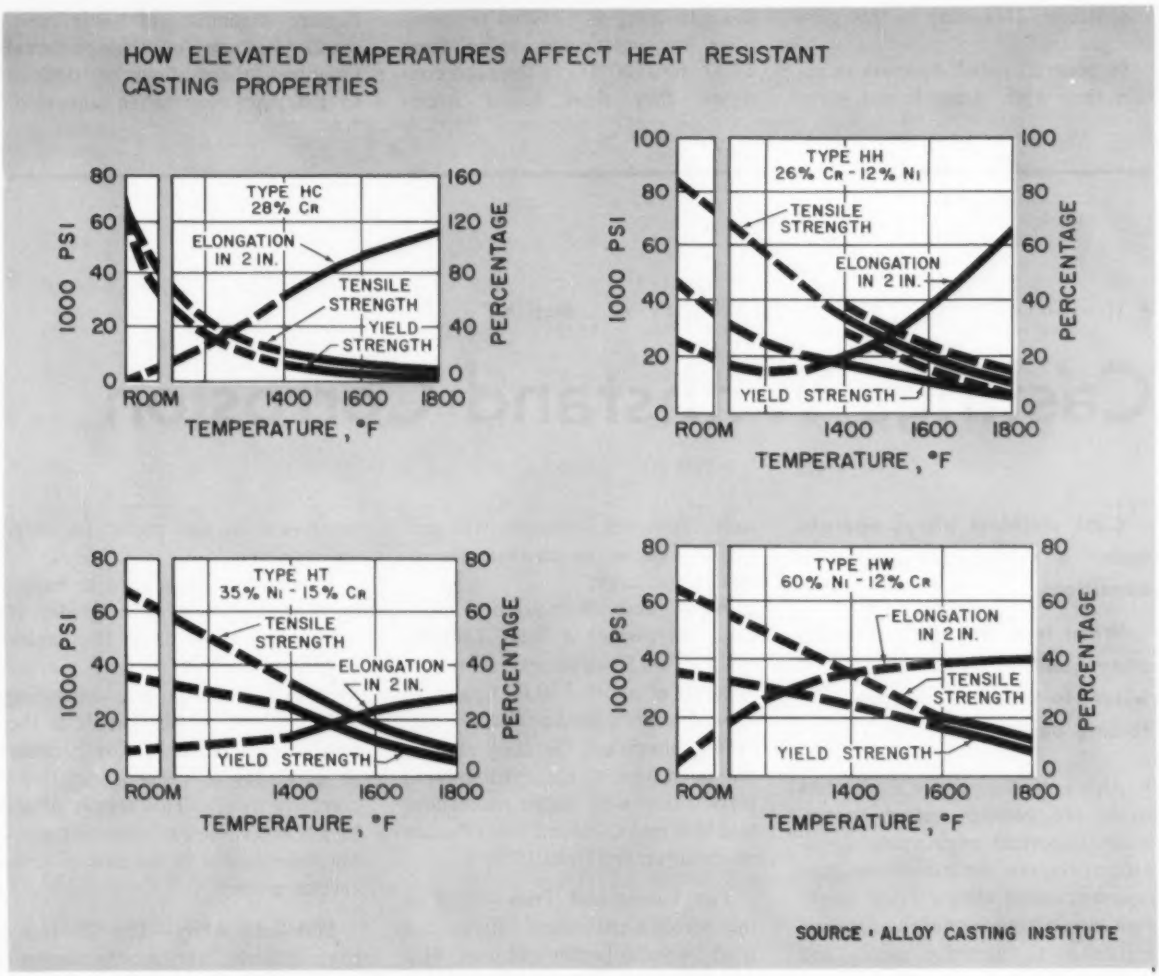
Resists Oxidation—Type HF (20 pct Cr, 10 pct Ni) is the cast version of an 18-8 stainless, except for a considerably higher carbon content. It is recommended for use up to 1600°F and has excellent oxidation resistance. Its general corrosion resistance is good, though inferior to comparable alloys with lower carbon content.

Both HE (29 pct Cr, 10 pct Ni) and HH (25 pct Cr, 12 pct Ni) alloys are recommended for use up to 2000°F. Both combine good high-temperature strength with excellent resistance to oxidation. The composition of HH alloy can be modified slightly to meet performance requirements at different operating temperature levels. Type HI (28 pct Cr, 15 pct Ni) has about the same mechanical properties but can be used at slightly higher temperatures (up to 2150°F) and has better oxidation resistance.

Flue Gases—Types HK (25 pct Cr, 20 pct Ni) and HL (30 pct Cr,

Chemistry of Cast Heat-Resistant Alloys

Alloy Casting Institute Type	C	Mn, max.	Si, max.	P, max.	S, max.	Cr	Ni	Mo, max.
HC	0.50 max.	1.00	2.00	0.04	0.04	26.0-30.0	4.0 max.	0.5
HD	0.50 max.	1.50	2.00	0.04	0.04	26.0-30.0	4.0- 7.0	0.5
HE	0.20-0.50	2.00	2.00	0.04	0.04	26.0-30.0	8.0-11.0	0.5
HF	0.20-0.40	2.00	2.00	0.04	0.04	18.0-23.0	8.0-12.0	0.5
HH	0.20-0.50	2.00	2.00	0.04	0.04	24.0-28.0	11.0-14.0	0.5
HI	0.20-0.50	2.00	2.00	0.04	0.04	26.0-30.0	14.0-18.0	0.5
HK	0.20-0.60	2.00	3.00	0.04	0.04	24.0-28.0	18.0-22.0	0.5
HL	0.20-0.60	2.00	3.00	0.04	0.04	28.0-32.0	18.0-22.0	0.5
HT	0.35-0.75	2.00	2.50	0.04	0.04	13.0-17.0	33.0-37.0	0.5
HU	0.35-0.75	2.00	2.50	0.04	0.04	17.0-21.0	37.0-41.0	0.5
HW	0.35-0.75	2.00	2.50	0.04	0.04	10.0-14.0	58.0-62.0	0.5
HX	0.35-0.75	2.00	2.50	0.04	0.04	15.0-19.0	64.0-68.0	0.5



20 pct Ni) resist both oxidation and the corrosive effects of sulphur-bearing gases. With higher sulphur atmospheres, HL can be used at temperatures above 1800°F. Both alloys have good hot strength and are ideal for general structural applications.

The high nickel cast alloys represent more than half of the total normal production of these materials. They consist of the HT, HU, HW, and HX alloys, all containing more than 33 pct Ni. They are commonly used for all types of furnace parts and heat treating trays and fixtures. All have good thermal shock resistance and stand up well in carburizing atmospheres.

Effect of Composition — The chemical composition of each alloy is often the deciding factor in determining its suitability for a particular application. As nickel content is increased, tensile strength at elevated temperatures is lowered slightly, thermal shock resistance improves, and the tendency to carburize is significantly decreased. Increasing chromium content improves both corrosion and oxidation resistance.

Higher carbon levels definitely improve hot strength, though they may lower resistance to corrosion in some cases. Higher silicon contents tend to improve resistance to carburizing atmospheres but have an adverse effect on strength at elevated temperatures.

Special Grades—A number of proprietary corrosion resistant cast alloys also have excellent high-temperature properties. The Hastelloys are included in this group. They are essentially nickel-base alloys with high (18-30 pct) molybdenum. More expensive than iron-base materials, they are particularly suitable for precision casting.

Hastelloy A and B contain no chromium and are highly resistant to reducing atmospheres. Their oxidation resistance is poor at temperatures exceeding about 1400°F. A chromium-containing Hastelloy (Type C) is recommended for resisting oxidation at temperatures up to 2100°F. Its other corrosion resisting characteristics are equally good.

Blading Alloys—Cobalt-base alloys were originally used for gas-turbine blading. They are heat-resistant alloys, suitable for precision casting, that can be safely subjected to high stress. Both Vitallium

and Stellite 21 belong to this general group.

In general, cobalt-base alloys retain their high strength and resistance to creep at elevated temperatures by progressive aging from 1300° to 2100°F. In the aged condition, they show higher stress-rupture strengths and lower creep rates. Because of their unusual toughness, these alloys are difficult to machine even when annealed.

Castings Withstand Corrosion

Cast stainless alloys operate under a variety of corrosive conditions.

When is a straight chromium alloy good enough? When is it wiser to choose a nickel-containing austenitic grade.

▪ Although the wrought stainless steels are perhaps better known, many important engineering applications require the use of cast corrosion-resistant alloys. These materials are designed primarily for their resistance to corrosive media and are intended for operation at temperatures below 900°F. They are used in chemical plants, oil refineries, textile and paper mills, sanitation, building construction, and transportation.

In common with cast heat-resistant alloys, these materials are made in either induction or electric-arc furnaces. They are suitable for static, centrifugal, or precision casting. Their chemical composition is closely related to the heat-resistant grades but their carbon content is usually lower. For optimum corrosion resistance, these alloys are almost always heat treated.

Straight Chrome Alloys—Types CA, CB, and CC are ferritic-martensitic, straight-chromium alloys. The number following the alloy designation indicates nominal carbon content. These materials are resistant to both oxidation and erosion. Oxidation resistance will generally improve as chromium content is increased.

All of these alloys are heat treatable. As quenched from 1800°F, type CA-15 develops a tensile strength of about 230,000 psi with a yield slightly under 180,000 psi. In this condition, the alloy may be tempered back to a desired strength level. Alloys with higher nickel content (CB and CC) tend to air harden when air cooled from 1500°F.

For Values and Trim—Most of the straight-chromium alloys are used for valve bodies and trim. At a carbon level not above 0.20 pct, the CC alloy may also be used for nitric acid containers. Because of the limited versatility of some of these alloys, their production has fallen off in favor of the austenitic grades.

The CE, CF, CG, CH, and CK alloys are austenitic iron-nickel-chrome types. Because of their higher chromium content (26-30 pct), CE alloys may be made with a higher carbon content than CF types without the danger of excessive carbide precipitation. As cast, the CE alloy consists structurally of austenite, ferrite, and carbides.

Structure Helps — This mixed structure tends to limit its susceptibility to intergranular corrosion. These alloys may be used without heat treatment and may be safely welded without subsequent solution treating. Their principal applications are in valves, fittings, pumping equipment in the paper industry, and trim.

More CF alloy is used in industry than any of the other grades. It is the cast version of an 18-8 stainless with carbon content varying from 0.08 to 0.20 pct, depending upon specific application. It is the best general-purpose alloy because of its ability to resist a variety of corrosive media. This family of alloys is austenitic and generally nonmagnetic except in the case of low-carbon grades.

Stabilized Alloy—The CF types have a fairly high tensile strength (80-88,000 psi) and yield (40-45,000 psi). They are not hardenable but are solution treated for improved homogeniety of structure and corrosion resistance. They may be modified with small additions of molybdenum, columbium, or selenium.

About 2 to 3 pct Mo may be added to CF grades to improve their resistance to sulphuric acid attack. Where nitric acid is involved, molybdenum should be omitted since it will actually lower corrosion resistance.

The addition of columbium (based on carbon content) is intended as a carbide stabilizer. Its effect is similar to that obtained in wrought stainless materials. Columbium is a preferential carbide former and avoids depletion of chromium from the matrix in the sensitizing temperature range. With-

Chemistry of Cast Corrosion-Resistant Alloys

Alloy Casting Institute Type	C max.	Mn, max.	Si, max.	P, max.	S, max.	Cr	Ni	Other
CA-15	0.15	1.00	1.50	0.04	0.04	11.5–14.0	1 max.	Mo, 0.5 max.
CA-40	0.20–0.40	1.00	1.50	0.04	0.04	11.5–14.0	1 max.	Mo, 0.5 max.
CB-30	0.30	1.00	1.00	0.04	0.04	18.0–22.0	2 max.	0.90–1.20 Cu optional
CC-50	0.50	1.00	1.00	0.04	0.04	26.0–30.0	4 max.	.....
CE-30	0.30	1.50	2.00	0.04	0.04	26.0–30.0	8.0–11.0	.....
CF-8	0.08	1.50	2.00	0.04	0.04	18.0–21.0	8.0–11.0	.....
CF-20	0.20	1.50	2.00	0.04	0.04	18.0–21.0	8.0–11.0	.....
CF-8M	0.08	1.50	1.50	0.04	0.04	18.0–21.0	9.0–12.0	Mo, 2.0–3.0
CF-12M	0.12	1.50	1.50	0.04	0.04	18.0–21.0	9.0–12.0	Mo, 2.0–3.0
CF-8C	0.08	1.50	2.00	0.04	0.04	18.0–21.0	9.0–12.0	Cb: 8 x C min., 1.00 max.
CF-16F	0.16	1.50	2.00	(a)	(a)	18.0–21.0	9.0–12.0	(a)
CG-12	0.12	1.50	2.00	0.04	0.04	20.0–23.0	10.0–13.0	.....
CH-10	0.10	1.50	2.00	0.04	0.04	22.0–26.0	12.0–15.0	.....
CH-20	0.20	1.50	2.00	0.04	0.04	22.0–26.0	12.0–15.0	.....
CK-20	0.20	1.50	2.00	0.04	0.04	23.0–27.0	19.0–22.0	.....
CN-7M Cu	0.07	1.50	(b)	0.04	0.04	18.0–22.0	21.0–31.0	May contain Mo and Cu

(a) For free-machining properties, suitable combinations of Se, P, Mo and S may be used.

(b) Silicon content varies for different proprietary alloys.

out a stabilizer, the chromium will tend to form complex carbides known as sigma phase. These carbides precipitate in grain boundaries and severely lower resistance to intergranular corrosion.

Helps Machining—Selenium improves machinability. In practice, very few orders call for the selenium addition. Foundries, as a rule, prefer not to use it. And the customers, evidently, have not found it to be sufficiently advantageous to warrant the extra trouble and expense. Although the CF alloys are fairly difficult to machine, the solution to the problem is being found in improved tooling rather than in alloy modifications.

CG and CF alloys are very nearly the same in most respects. With carbon contents below 0.20 pct, the CH alloy comes quite close to the properties of CE. CK contains the highest alloy content of the group and is used extensively in the pulp and paper industry. This material may be slightly more difficult to machine than the CF type.

Higher Nickel — Remaining are three alloy groups that contain a higher percentage of nickel than chromium. These are the CM, CN, and CT types. With a nominal carbon content of about 0.25 pct, CM alloy is widely used in oil refinery equipment. It combines fairly high strength with an ability to resist dilute sulphric acid.

Both CN and CT alloys stand up well in hot sulphuric acid. They are also used in other applications involving severe corrodents. They may be modified by small additions of other elements—notably molybdenum and copper. Some of these variations constitute proprietary alloys covered by patent. All of these grades are machinable and can be welded.

For some industrial applications, the cast alloys appear to exceed the performance of wrought grades.

Austenitic Manganese Steels For Abrasive Wear

Austenitic managanese steels work harden under impact, become tougher and even more abrasion resistant.

But for some applications where abrasion is the problem, cast irons or hardened steel are actually preferable.

▪ Tough, ductile, and nonmagnetic, austenitic manganese steels can withstand both severe wear and heavy impact. They are available as either castings or such rolled shapes as sheet, plate, bar stock, wire, and rails. Nominally, they contain 1.0 to 1.4 pct C and 10 to 14 pct Mn.

Because the lower manganese level (10 pct) may adversely affect tensile strength and the highest manganese level (14 pct) provides no advantage, most of these alloys are made in the 12-13 pct Mn range. Carbon content is usually held from about 1.15 to 1.2 pct. This is considered the optimium range. Too high a carbon content, according to Avery and Day, may cause trouble in heat treatment or in the foundry.

Heat Treatment Helps—The as-cast or as-rolled product is quite brittle. For this reason, manganese steels are heated to above 1850°F and water quenched. The quench should be rapid to obtain the best properties. Final structure is predominantly austenitic, although surface decarburization and slight loss of manganese during heat treatment may result in a partially martensitic skin.

Austenitic manganese steels tend to work harden to a marked degree. It is likely that they work harden more than any of the other known alloys of iron. So that even though the as-heat treated austenitic structure may be relatively soft, plastic deformation is capable of increasing hardness to as high as 550 Bhn. Where some deformation normally occurs in service, this work-hardening tendency is a distinct advantage.

Hardens By Impact — Impact, more than sliding-type friction, appears to do the most to promote work hardening. In fact, the heavier the impact, the deeper is the hardening effect. When work hardening occurs, it involves the absorbing of a great deal of energy. This, too, has useful engineering applications.

Although these steels are highly abrasion resistant, they are best suited for certain types of abrasive wear. Sliding abrasive wear without any impact is handled far better by martensitic cast irons. For moderate impact, a hardened steel will probably suffice. So that manganese steels should logically be used only when abrasion is combined with heavy impact.

Other Uses — There are few exceptions to this general rule, however. In metal-to-metal contact, manganese steels will tend to work harden and reduce the tendecy to gall. Compressive loads have about the same general effect as intermittent impact. For this reason, manganese steels are used for sheaves, rails and castings for trackwork, and water-lubricated bearings.

Although these materials can be used at very low temperatures—even as low as —100°F—they will tend to embrittle at temperatures over 500°F. These temperature limits should be recognized before a manganese steel is chosen for ap-

Table 1 | Mechanical Properties of Austenitic Manganese Steels

	Standard, Cast*	Standard, Rolled*	Ni-Mn, Cast*	Ni-Mn, Cast*	Ni-Mn, Rolled
Carbon, pct	1.0–1.4	1.1–1.4	0.34	1.10–1.17	1.1–1.4
Manganese, pct	10–14	11–14	12.5	12.5–12.7	10–14
Silicon, pct	0.2–1.0	0.2–0.6	0.48	—	0.2–0.6
Nickel, pct	—	—	3.46	3.1–3.6	3.25–3.75
Yield Strength, 1000 psi	50–57	50–60	—	—	50–63
Tensile Strength, 1000 psi	100–145	131–142	105–127	113–140	130–155
Elongation, pct	30–65	40–60	45–65	44–70	48–72
Reduction of area, pct	30–40	35–50	35–45	35–45	40–60
Hardness, Bhn	185–210	170–200	170–180	150–170	165–195
V-notch impact, Charpy	90–220	90–150	95–106	105+	90–150

* Toughened by water quenching.

Table 2 | Fatigue Properties of Cast Austenitic Mn Steels

Composition, pct				Tensile	Elongation,	Stress	Cycles to
C	Mn	Si	P	Strength, psi	pct in 2 in.	1000 psi	Failure*
1.17	12.8	0.34	0.046	(Specimen polished)		40	4,071,500
1.17	12.8	0.34	0.046	(Specimen oxidized)		40	806,000
1.13	12.8	0.55	0.056	104,250	34.5	48	294,800
1.13	12.8	0.55	0.056	102,750	30.0	40	353,900
1.13	12.8	0.55	0.056	103,500	35.0	38	12,653,600
1.13	12.8	0.55	0.056	109,000	39.1	36	30,000,000**

* Rayflex apparatus. Except as indicated, bars were tested with the oxidized surface characteristic of heat treated specimens.

** Endurance Limit = approx. 0.34 × tensile strength.

plications where frictional temperatures may be on the high side.

Special Alloys—While it is true that certain limited applications have been found for both low-manganese and low-carbon grades, these materials are of slight practical importance. In contrast, additions of nickel to these steels have a number of useful applications. One group of alloys containing 0.60-0.90 pct C and about 3 pct Ni are frequently used for welding rod and many wrought and cast shapes. A particular advantage of these alloys is that they resist embrittlement up to about 800°F.

Chromium is also added to some types of manganese steels. While it is not likely to improve wear resistance, it can increase yield strength, moderately increase corrosion resistance, and lessen the tendency of embrittlement at high temperatures. A more complex alloy contains chromium (10-12 pct), manganese (4-9 pct), nickel (6-9 pct), silicon (2 pct), and carbon (0.30-0.35 pct). This is a heat-resistant type alloy for service up to 1400°F.

Tough to Machine—Because of its work-hardening characteristics, manganese steel is difficult to machine. It can be cut with either cemented carbide or cobalt high-speed tools. In both cases, a sulphur-bearing cutting oil is helpful.

As with most extra-tough materials, cuts should be moderately heavy to lessen the work-hardening effect. Speeds must be slow. Finishing operations, especially those requiring light cuts, should be handled by grinding.

In addition to many railroad applications, manganese steels are used in construction, mining, quarrying, oil-well drilling, steel and cement mills, dredging, and lumbering. Such equipment as rock crushers, grinding mills, power-shovel buckets and teeth, and gravel and rock handling pumps are typical examples of the materials' proper use.

Some metal-to-metal wear applications include sprockets, pinions, gears, wheels, conveyor chain, and wearing shoes and plates.

Table 3 | Physical Properties of Austenitic Mn Steel

Work hardening capacity, from 170-200 Bhn to 450-550 Bhn
Specific gravity, 7.9
Density, 0.286 lb per cu in. (493 lb per cu ft)
Electrical resistivity, 70 microhm-cm*
Electrical conductivity, 0.0143 megohm-cm*
Specific heat, 0.145 cal per g
Melting point, 2450 °F
Thermal conductivity* (0.8 pct C, 3 pct Ni)
——0.031 cal per sq cm/cm/second/°C
——90 Btu per sq ft/in/°F
Magnetic permeability, 1.003 to 1.03 (H=24)
——without surface preparation, 1.30+
Wet quartz sand abrasion factor, 0.75 to 0.85 (SAE 1020 = 1.00)

Coefficient of linear thermal expansion, in. per in. per °F

Average		Instantaneous	
100–300 °F	0.0000102	100 °F	0.0000102
100–500 °F	0.0000113	200 °F	0.0000106
100–700 °F	0.0000119	300 °F	0.0000111
		400 °F	0.0000119
		500 °F	0.0000126
		600 °F	0.0000134
		700 °F	0.0000136

* Varies considerably with heat treatment.

Special Steels For Nitriding

Nitriding provides a hard, wear-resistant case with unusual fatigue properties.

But although many low-alloy steels can be nitrided, a special series of steels gives the best results.

▪ Many low alloy steels can be nitrided with some degree of success. Among those which show promise in this respect are 4140, 4340, 6140, and 8740. But experience indicates that the best nitriding results can be obtained with those steels especially designed for nitriding.

These special grades, all of them containing a small aluminum addition (0.85-1.20 pct), are known as Nitralloy steels. In the nitrided condition, they provide an extremely hard surface. Because the nitrided layer is stressed in compression, its fatigue properties are excellent.

Major Types — There are four types of Nitralloy steels: Grades 135, 135 modified, Nitralloy N, and Nitralloy EZ. Grades 135 and 135 modified are the most widely used, the latter grade finding many applications in the aircraft industry. Nitralloy N is a special grade containing about 3.5 pct Ni. It is used where extra high core hardness is required. The EZ grade is basically the same as type 135 except for a selenium addition to improve machinability.

In the tempered condition required prior to nitriding, type 135 provides tensile strengths ranging from 121,000 psi to about 155,000 psi. The aircraft grade, 135 modified, has a tensile-strength range of 145,000 to 206,000 psi in the tempered condition. Nitrided case hardness of these materials is particularly high, ranging from 15N93 to 15N95 at the surface.

Tougher Core—The nickel-containing grade, Nitralloy N, provides a tougher core material with a slightly lower case hardness after nitriding. The nickel addition, according to the Nitralloy Corp., "strengthens and hardens the core and thereby provides better support to the case. It develops dispersion hardening in steels containing appreciable proportions of aluminum, by means of which articles may automatically acquire higher core strength and elastic properties during nitriding."

To demonstrate the effects of dispersion hardening on core properties during nitriding, a typical heat of steel went into nitriding with a tensile strength of 132,000 psi and a yield strength of 114,000 psi. After nitriding, these core properties were raised to 190,250 psi and 180,000 psi respectively. Brinell hardness jumped from 277 to 415.

For Free Machining—In bar form, a high sulphur grade of Nitralloy provides free-machining characteristics. Selenium is substituted for sulphur in forgings to serve the same purpose. The sulphur-containing grade should not be used when maximum impact properties are required.

All Nitralloy grades must be hardened and tempered prior to nitriding. The tempering temperature should always be above the nitriding temperature so that no further tempering will occur during nitriding.

Machining Tips—To prevent the build-up of high internal stress, shallow cuts and small feeds should be used in machining. Feeds may range from 0.045 in. for roughing down to 0.004 in. for finishing. Those feeds which are most commonly used are 0.015 to 0.030 in. for roughing and 0.005 to 0.007 in. for finishing.

When high-speed tools are used, cutting speeds should run from 50 to 75 sfpm for heavy cuts and from 90 to 130 sfpm for light cuts. Using cemented - carbide tools, surface speeds as high as 600 cfpm may be attained for fine finishing cuts. It is recommended that cobalt high-speed tools be used in machining forgings.

Easier Drilling — Drilling these steels is easiest at a hardness level of about 250 Bhn. Drills should have point angles of 130°-140° and lip clearances as low as 5°. With the free-machining grades, a point angle of 118° and a lip clearance of 10° are recommended.

In the normalized condition, Nitralloy steels can be satisfactorily broached with conventional broaches. For internal broaching, a cut per tooth of 0.004 to 0.005 in. is recommended. On surface broaching, the cuts vary from 0.0025 to 0.0035 in. per tooth depending on length, shape and size of the part. In general, lower broaching speeds are preferable because they produce less internal stress.

Tapping and Milling—High-speed taps with a 10° to 15° hook are best for tapping most Nitralloy grades. Peripheral speeds should be held to 20-35 sfpm. For threading, the chamfer or lead angle should be at least 20°. Speeds for threading should be less than half that used for regular screw stock. With the higher carbon grades, threading speeds should be proportionately lowered.

For milling rough cuts, speeds of 60 to 80 sfpm and feeds of 0.008 to 0.010 in. are standard practice. For finish cutting, speeds should be increased considerably to obtain the best surface finish.

Table 1 | Short Time High Temperature Properties of 200-Series Steels

Temp., °F	0.2 pct Yield Strength, 1000 psi			Tensile Strength, 1000 psi			Elongation, pct in 2 in.		
	Type 202	Type 204	Type 204L	Type 202	Type 204	Type 204L	Type 202	Type 204	Type 204L
R.T.	51.6	55.9	50.6	108.2	103.6	99.2	55.0	51.0	50.5
200	43.4	47.5	39.3	95.8	97.8	85.8	61.5	59.0	55.0
400	33.4	35.5	31.5	85.1	86.7	76.1	44.0	47.0	41.0
600	29.8	31.2	27.5	83.6	86.3	74.1	47.0	49.0	40.0
800	28.1	28.9	24.4	77.8	78.8	70.0	46.0	50.0	42.0
1000	25.0	25.6	22.0	72.1	70.9	61.7	38.5	42.5	32.0
1200	22.6	23.2	20.6	55.7	53.7	46.1	28.0	22.5	22.5
1400	19.4	21.9	17.8	30.8	23.1	32.1	34.5	32.0	44.0
1600	15.1	15.4	13.8	17.3	16.7	17.2	42.0	40.0	41.0

Analyses

Type	C	Mn	Si	Cr	Ni	N_2	Gage
202	0.098	10.08	0.69	17.27	4.07	0.14	0.050
204	0.066	9.32	0.64	18.41	5.53	0.24	0.070
204L	0.023	10.40	0.56	17.36	4.97	0.20	0.062

200-Series Stainless Steels

Are the 200-series stainless steels just a weak substitute for 18-8? Or, do they have real merits of their own?

Here is a rundown of some of their more important properties.

▪ Right now the availability of nickel is not a major purchasing problem. But there is always the chance that the use of nickel may be restricted in periods of national emergency. That's one good reason for knowing how to make better use of the stainless substitutional alloys—the 200 series. Most of them are very low in nickel.

Various grades of the 200 series contain from 16 to 19 pct Cr, from 5 to 10 pct Mn, from 3.5 to 7 pct Ni, and not more than 0.25 pct N. Carbon content is not allowed to exceed 0.15 pct and may run as low as 0.03 pct or less.

Balance Chemistry — According to Allegheny Ludlum Steel Corp., "it is possible to make high-chromium austenitic steels in a wide range of analyses by properly balancing the austenitizing elements (C, Mn, Ni, and N) against the chromium content. For maximum corrosion resistance, however, the carbon and chromium percentages are fairly well defined.

"In general, the carbon content must be kept below a maximum of approximately 0.15 pct, and the chromium content maintained above approximately 17 pct. For uses involving welding and stress relieving and requiring high corrosion resistance, the carbon content may be held to a maximum of 0.08 pct and the chromium to a minimum of 18 pct."

Versatile Alloys — The strength and ductility of these alloys is comparable to the austenitic grades 301, 302, and 304. They are equally formable and weldable. They can be readily cold drawn to desired strength levels. Although they have slightly higher strength in the annealed condition, this does not affect their ductility adversely.

By varying their chemical composition, it is possible to control their work-hardening properties to a useful extent. The compositions of types 201 and 202, for example, are such that they duplicate the work-hardening characteristics of types 301 and 302. This is an important feature in forming, bending, and drawing operations. It means that, if required, the 200 series could be substituted for 300 grades on very short notice with little shop difficulty.

Hot Strength—The elevated temperature properties of 201 and 202

Table 2 | Stress Rupture Properties of 200-Series Steels

Type	Temp., °F	Rupture Strength, psi			Elongation, pct in 2 in.	
		100 hrs	1000 hrs	10,000 hrs*	100 hrs	1000 hrs
202	1200	31,000	25,000	20,000	32.5	23.0
	1350	15,200	11,100	7,600	44.0	39.0
	1500	8,800	4,400	——	45.0	42.0
204	1200	30,000	23,600	18,000	9.5	10.0
	1350	17,500	11,200	7,200	25.0	33.5
	1500	8,800	4,400	——	45.0	42.0
204L	1200	29,000	20,300	14,200	22.0	9.0
	1350	11,000	6,700	4,100	16.0	16.0
	1500	5,000	2,600	——	18.5	——

* Extrapolated value.

Courtesy of Allegheny Ludlum Steel Corp.

are very encouraging. In short time tests, they appear to be somewhat better than 302 in tensile and stress-rupture. Up to 1500°F, their oxidation resistance is about comparable. Above 1500°F, they do not have the same ability to resist oxidation.

Their low-temperature toughness is quite remarkable. Izod impact values of annealed 201 at —300°F range from 69 to 71 ft-lb. Under similar conditions, type 204 achieves a rating of 119 to 120 ft-lb. This compares with values for 304 and is far better than the 38-44 ft-lb rating given type 301. Another advantage is the fact that the 200 steels have no transition temperature from ductile to brittle fracture common with most ferritic and martensitic steels.

Resist Corrosion—When it comes to corrosion resistance in such media as boiling nitric acid, the 200 series steels are definitely inferior to type 304L. The only exception is the 204L grade with extra low carbon and about 6 pct Ni. In nitric acid, it is obvious that both nickel and high chromium are essential.

This is not true of less serious corrosive media. As far as acetic, sulphurous and phosphoric acids are concerned, the 200 series steels are about on a par with 18-8 stainless. Resistance of these materials to atmospheric corrosion—even corrosive industrial atmospheres — is generally excellent.

Stress Cracking—As is the case with 18-8 grades, the 200 series steels are subject to stress corrosion cracking. This is particularly true in the presence of corrosive chlorides. It is a limitation that must be taken into consideration from the design standpoint. The combination of high residual stress and surrounding chloride media should be avoided.

The newer steels can be satisfactorily welded by such conventional methods as shielded arc with or without filler metal, arc welding with coated electrodes, and spot welding. Annealing after welding is not required. Weld ductility is reported to be good. Weld strength is generally comparable to that of the base metal in the annealed condition.

Annealing Practice—No changes in annealing and pickling practice are required for 200-series steels. Like the 18-8 grades, they can be annealed at temperatures up to 2050°F. At these temperatures, they are less resistant to scaling than the Chrome-nickel grades. After annealing they must be cooled rapidly, especially in the sensitizing range of 800° to 1500°F.

Among the applications where the 200-series steels are suitable substitutes for the 300 grades are decorative and architectural trim, sinks, cooking utensils, hospital equipment, dairy equipment, cabinet tops, tubing, high-strength structural components, siding and roofing for railway cars and trailers, and some electrical applications requiring low magnetic permeability.

Popular acceptance of these steels has been gradual but continuously increasing.

ACKNOWLEDGMENT: The editors want to thank the many production experts and metallurgists whose ideas and suggestions helped make this feature possible. They especially want to acknowledge the generous assistance of Allegheny Ludlum Steel Corp., Alloy Casting Institute, Associated Spring Corp., Bethlehem Steel Co., The Nitralloy Corp., Republic Steel Corp., and U. S. Steel Corp.

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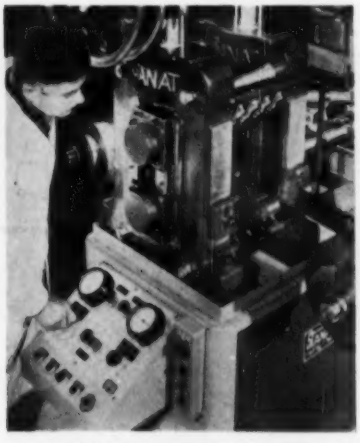
Eyecatchers at the Metals Show

Watch for these displays as you walk the aisles of the upcoming Metal Exposition.

Such equipment, services and products can help you make the most of 1959, which is shaping up to be a big production year.

Strip Mill

First of a kind, this reversing strip mill is a high-precision, comparatively low cost unit. Its principal use is in specialty order shops and pilot production plants. Handling both ferrous and nonferrous work, it makes possible installation of a complete reversing mill facility



at a minimum capital investment. This 1½ in. and 5 in. x 8 in. reversing mill on exhibit represents just one of a complete line of the manufacturer's reversing 2-high/4-high combination mills. These range in roll size from ¾ in. and 3 in. x 4 in. to 4 in. and 16 in. x 20 in. The two-way strip winding mechanism comprises both a pay-off and a recoiler. These are bracketed to the mill base and driven from the pinion stand. Powerful air clutches furnish extremely sensitive control of front and back tension over a very wide range. Calibrating in terms of air pressure provides accurate tension reproduction. An operator's console is mounted to the base. In recent tests the mill successfully reduced such materials as stainless steel, platinum, gold plate, nickel and molybdenum strip. (Stanat Mfg. Co., Booth 2333.)

For more data circle No. 1 on postcard, p. 269

Metals Testing

Two new instruments aim to make the job of the metallurgist easier. To be shown for the first time, at the exposition, they make checking of tensile and compressive loads in testing machines relatively rapid and convenient. Called elastic loop dynamometers, they feature highly precise optical reading arrangements. These utilize Carl Zeiss spiral measuring microscopes to obtain direct readings of elastic deformations as close as 0.0001 mm (1/10 micron). Main advantage of the direct reading system is reproducibility of results made by different operators. Precision and sensitivity of readings obtained by different operators using these dynamometers are extremely high. (Gries Industries, Inc., Booth 550.)

For more data circle No. 2 on postcard, p. 269

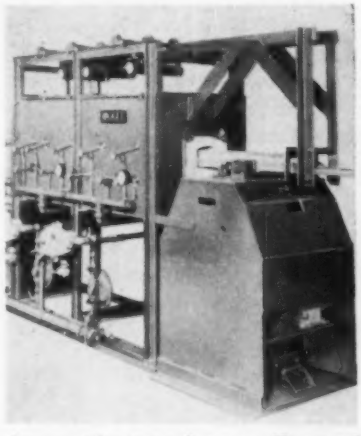
Heavy Press

Heavy-duty equipment, a motorized press, will be exhibited. Recently designed and shown for the first time is a 150-ton capacity electrically operated motorized press. Engineered and built to handle extra heavy jobs, the unit can take rough treatment in industrial use. With the motor operating, it delivers a retractable ram speed of 14-33 ipm. Overall height is 90¼ in.; frame space is 45 x 72¼ in.; width between uprights is 48 in.; head horizontal travel is 19 in.; table travel is 24 in. Motors are reconnectable for operation on 220/440-v, 60 cycle, 3-phase circuits. Approximate shipping weight is 3400 lb. (ACCO Equipment Div., American Chain & Cable Co., Booth 1235.)

For more data circle No. 3 on postcard, p. 269

Furnaces

New reciprocating furnaces handle bright annealing and bright hardening of small stainless steel parts at temperatures to 1900°F. The latest model has a capacity of some 100 lb of stainless parts per hour. Furnaces' basic principle of operation is this: it moves forward



the work-conveying muffle and workpieces resting in it. This forward movement suddenly halts, causing workpieces to advance by their own momentum. Furnace construction includes an alloy muffle with a purging, heating and water-jacketed cooling section. The fully-enclosed alloy muffle permits holding of dewpoints as low as —90°F. Full seal muffle construction insures complete atmosphere uniformity throughout processing. Being completely sealed at the discharge end, atmosphere gas consumption is very low. Parts individually travel through the en-

tire processing cycle. Each part passes through a purging, heating and cooling cycle. There are no batch purging, heating and cooling. Observing the processing cycle is possible through openings in the charge and discharge ends of the muffle. (American Gas Furnace Co., Booth 2027.)

For more data circle No. 4 on postcard, p. 269

Hardness Testing

Fully-automatic, this new Rockwell "twin" hardness tester brings unusual flexibility to non-destructive, quality control metals checking. The automatic unit is capable of conducting up to 1000 tests per hour. It provides testing of the hardness of both ferrous and nonferrous metals. The tester classifies workpieces as too hard, too soft or correct. Known under the name TwinTester, the dual-function instrument is a combination unit which is capable of taking readings in both the Rockwell and Rockwell Superficial scales. It is primarily recommended for use in laboratories, tool departments, maintenance repair shops, etc. Also on display at the show will be a floor model Tukon tester. This



unit has a 136° diamond pyramid indenter for micro and microhardness testing. A model JR Rockwell unit with test point and dial illuminator and its C Brale diamond penetrator will be shown, too. So will a model JS Rockwell Superficial tester with its N Brale diamond penetrator. (Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc., Booth 1235.)

For more data circle No. 5 on postcard, p. 269

Ultrasonic Cleaner

Really large-volume cleaning operations are handled by this ultrasonic cleaning unit. Manufactured by a firm with long experience in mass-producing this type equipment, it'll appear publicly for the



first time at the exposition. The sonic blasting cleaner features a generator with a full 500-w output. Its fully-transducerized tank has 10-gal capacity. The generator employs tank selector and load selector switches so it can operate either one or two ultrasonic tanks alternately, or submersible transducers in tanks up to 30-gal capacity. Tank dimensions are 20-in. long, 11½-in. wide, 10-in. deep, letting it handle fairly large pieces. Alternatively, the generator can operate from six to ten high-energy submersible transducers, at any one time, for use in any arrangement in any shape tank up to 70-gal capacity. (Narda Ultrasonics Corp., Booth 2438.)

For more data circle No. 6 on postcard, p. 269

Inserting Unit

An automated assembly unit production installs Heli-Coil inserts; it'll appear for the first time at the show. A typical production line setup will illustrate a new automatic unit developed for automation in a transmission assembly operation at the Ford Motor Co. The exhibit includes a new high-speed inserting tool, hopper feed unit and special power tools for the installation of inserts. New miniature 4-40 screw-lock inserts, which eliminate need for lock washers, lock wires or lock nuts, will also be shown. (Heli-Coil Corp., Booth 1506.)

For more data circle No. 7 on postcard, p. 269

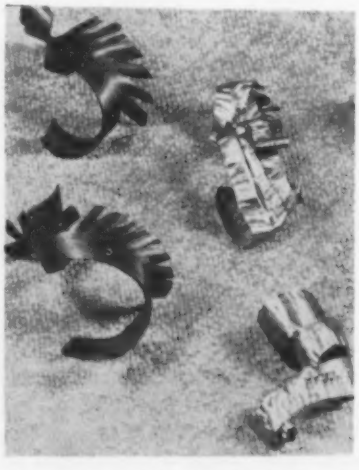
Spray Painting

Spray painting equipment and industrial and commercial cooling towers will be on display at the show. Included in one presentation will be: (1) new modular electrostatic spray painting units; (2) rotary automatic spray painting equipment with electric timers and conveyors; (3) a new paint heater; (4) paint pumps delivering paint at a 2 to 4-1 ratio. (Binks Mfg. Co., Booth 1501.)

For more data circle No. 8 on postcard, p. 269

Leaded Steel

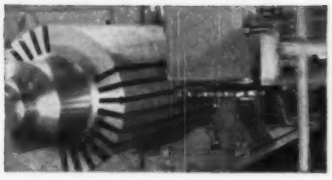
Actual machining of leaded steel forgings will take place at the show. These forgings are available in circular seamless forged and rolled



shapes from 18 to 145 in. O.D. They also come in open-die shapes to 30,000 pounds. The forgings offer outstanding reductions in machine time and tool wear, as well as

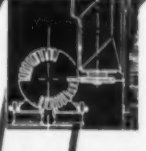
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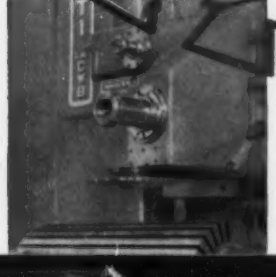
machining
a turbo alternator
rotor slot
by an INNOCENTI CWB
boring and milling machine
equipped with
heavy duty
high production
special headstock
model TE 2
profiling
is performed
without head removing.
large diameter
disk-type milling cutter
on the vertical spindle.



- CWB - BORING AND MILLING MACHINE



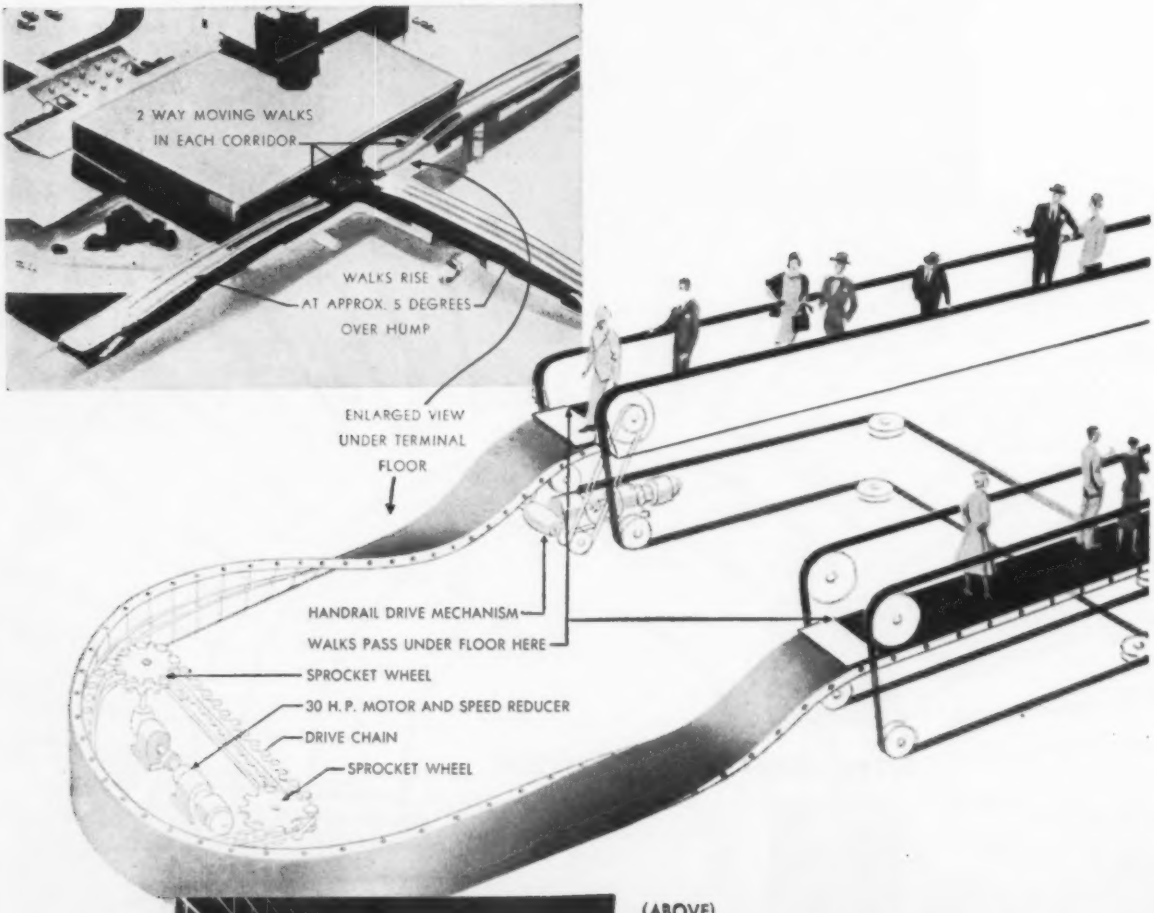
horizontal head
equipped with
finger-type milling cutter
for high speed
dovetail slots forming.
The head allows
a normal setting
of the machine
milling and boring
spindle
thus permitting also
flattening
and
milling operations
on rotor polygonal rotors.



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REVERE ALUMINUM





(ABOVE)
Schematic drawing showing the "Glide-Ride" moving sidewalk designed, manufactured and installed by HEWITT-ROBINS, INC., at the Love Field Air Terminal, Dallas, Texas.

(Opposite page)
Detail of balustrade with some of the various Revere Aluminum Extrusions used in the conveyors. The unseen track on which the handrail operates is extruded from Revere Bronze shape shown at bottom.

(LEFT)
"Much better than walking," say users of this moving sidewalk that has been a big hit ever since the day it was put into operation.

and BRONZE TEAM UP

to help make the world's longest "Moving Sidewalk"

an attractive, dependable operation

Placed in operation at the Dallas Love Field Air Terminal, Texas, early in 1958, the world's longest passenger conveyor system has proved the answer to efficient transportation of pedestrians.

The three units which total more than a quarter of a mile in length extend out from the main terminal over three separate bridges to the first loading gate of each finger, carrying passengers in both directions.

These new Glide-Ride conveyors were designed, manufactured and installed by HEWITT-ROBINS, INC. Playing 2 important roles in these conveyors are 22,000 lbs. of Revere Aluminum Extruded Shapes and 22,000 lbs. of Revere Extruded Bronze. The aluminum extrusions were used as floor cove molding, handrail molding, spoon molding between balustrades and rubber carpet, and as a wall cove between handrail and wall. Not only are these Revere Aluminum extrusions attractive and decorative but their satiny finish will remain so for years with an occasional soap and water cleaning the only maintenance required.

Hidden under the moving rail is the track extruded from Revere Bronze, taking constant daily rugged wear in its stride.

The selection of Revere Aluminum and Bronze Extrusions was not a mere matter of specification. It was the result of HEWITT-ROBINS Engineers and Designers consulting with Revere's Technical Advisory Service men in order to determine the alloys and the shapes best suited to do the job required.

And so it is with practically every industry you can name. When you take your supplier into your confidence, discuss your problems with him, you invariably are rewarded with a better product at less cost, because the material finally selected is the *exact* material for the best job.

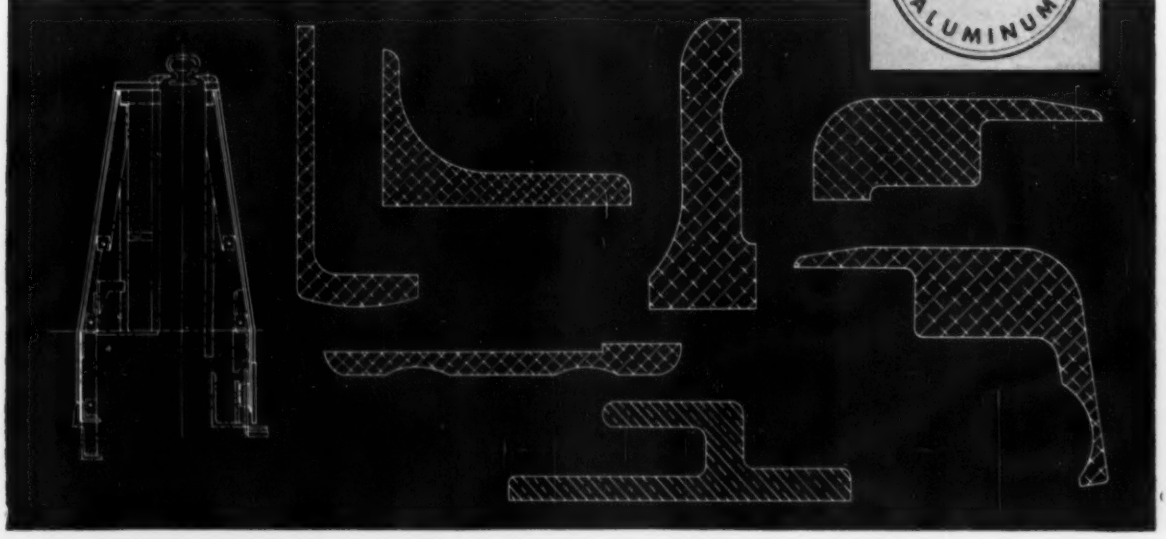
REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

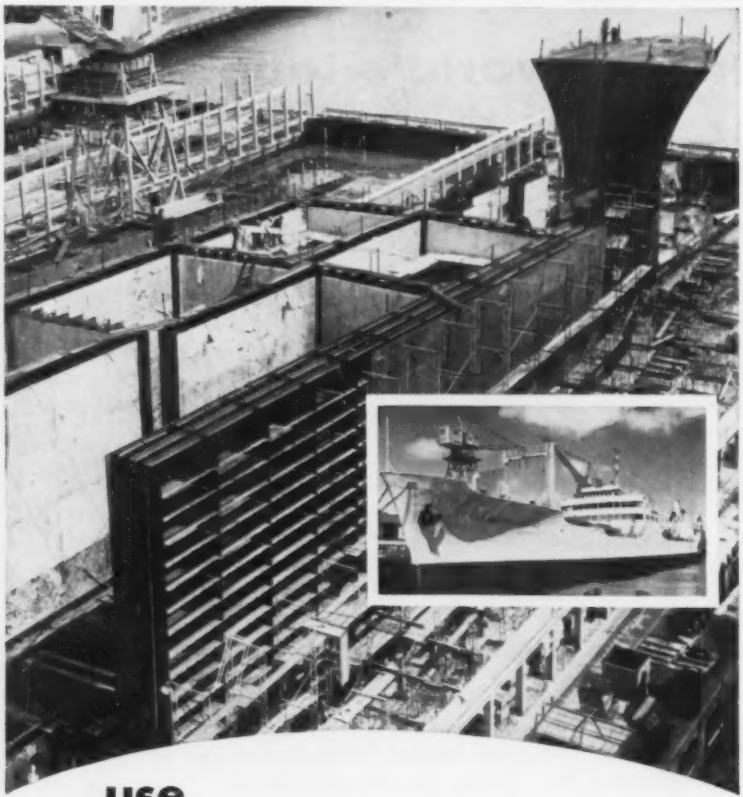
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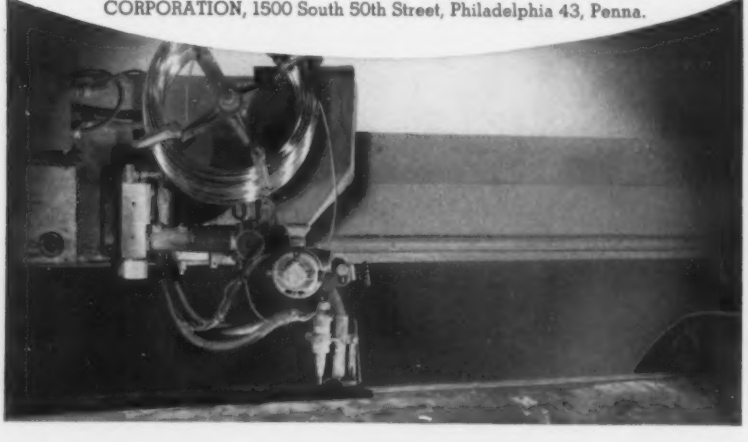
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ARCOSITE BONDED FLUX

The SS Angelo Petri—the first of its kind—is a new wine tanker carrying 26 welded cargo tanks with a 2 million gallon bulk capacity. Especially unusual was the use of submerged arc welding on both sides of the type 316 stainless-clad steel tanks. ARCOSITE C-17 FLUX and Arcos CHROMENAR 25/20 bare wire were used to assure proper physical, corrosion resistant properties, and joint soundness. To control dilution on the stainless side, the clad side was automatically gouged slightly by carbon arc. Another unusual achievement tending to retard corrosion was the cathodic—rather than anodic quality of the submerged arc welds. Write today for information on ARCOSITE BONDED FLUXES and ARCOS STAINLESS and NICKEL ALLOY ELECTRODES. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Penna.



significant improvements in surface finish, says their producer. Lead is added to the steel in an exclusive, patent-pending process. The machining operation at the show will be on a Lansing 20-in. precision center lathe. A tachometer, reading "sfpm," will indicate work being done on the steel. Depth of cut and type of steel will also be shown graphically. The company will machine 10L45 and 43L45 steel (the "L" signifies that the steel is leaded, and in this case comparable to standard grades 1045 and 4345). (ALCO Products, Inc., Booth 2207.)

For more data circle No. 9 on postcard, p. 269

Inspection Unit

Multi-frequency equipment being unveiled at the show provides high speed, non-destructive inspection of nonferrous and non-magnetic metals. The equipment is based on an advanced, versatile eddy current inspection system. It's adaptable to production line or independent testing of tubing, bars and wire for surface and subsurface defects, grade (chemical properties), dimensions, and physical and metallurgical properties. Typical metals it tests include: aluminum, titanium, zirconium, copper, copper - nickel



alloys, brass and similar alloys, high-temperature alloys and austenitic stainless steels. Inspection speeds range from 200 to 600 fpm. Coils are available for testing ⅛- to 3-in. OD material. Magnetic analysis uses two frequencies op-

erating at once. There are two flaw detection circuits and one property variation detection circuit for each frequency. This dual frequency set-up, offering six inspection methods, simultaneously detects a variety of flaws and property variations. Three frequency ranges (seven frequencies each) are available. These cover 1.8 to 700 kc. (Magnetic Analysis Corp., Booth 1136.)

For more data circle No. 10 on postcard, p. 269

Metals Saw

Especially designed and built for working today's nonferrous metals is a dynamic new saw. The very appearance of this radial-arm metal cutting machine suggests efficiency



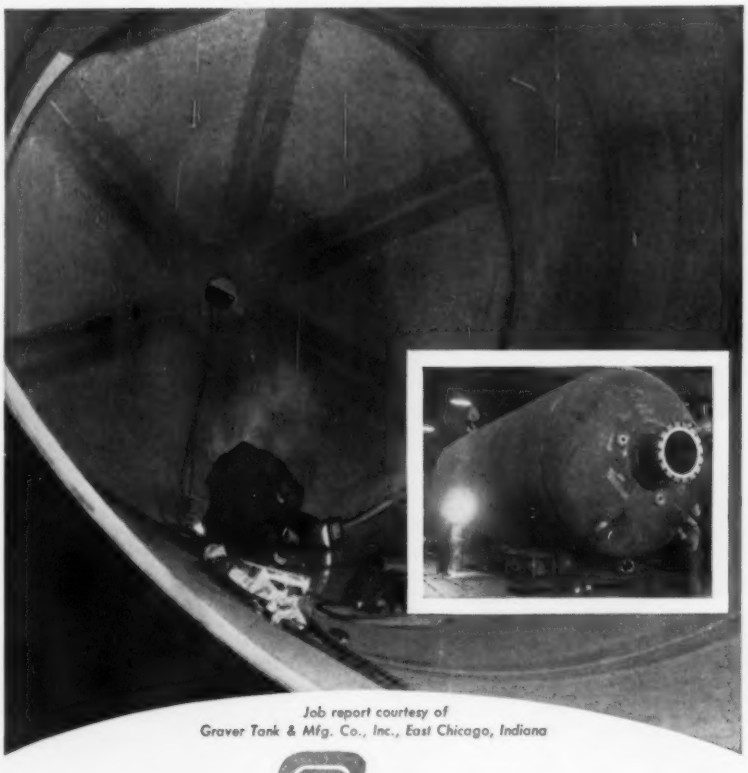
and accuracy. And performance backs this up. Handling a variety of jobs, it cuts nonferrous metals at any angle. It'll even slot or slit at points desired. At the show the unit will shape aluminum extrusions. The machine offers several power features: power elevation provides quick, safe set-ups; power brakes stop the saw within seconds; the power cross feed has a coolant mist spray hook-up which works only during the cutting cycle. The unit has a 24-v power circuit control. (DeWalt Div., American Machine and Foundry Co., Booth 2530.)

For more data circle No. 11 on postcard, p. 269

Vacuum Furnace

A new production vacuum and argon melting furnace makes cast-

When stainless welds must be free of microcracks



Job report courtesy of
Graver Tank & Mfg. Co., Inc., East Chicago, Indiana

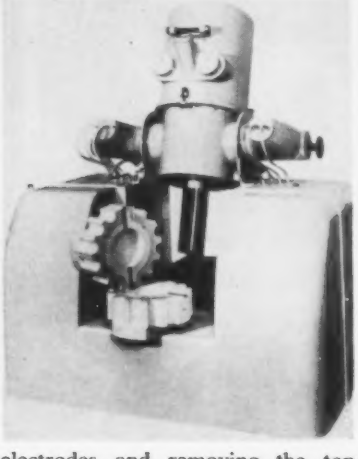
WELD WITH ARCOS

STAINLESS ELECTRODES

This 93,400-lb. 3500 cu. ft. digester is installed at Finch, Pruyn and Company, Inc., manufacturers of printing and converting papers. It converts hardwood into paper pulp using highly corrosive acids at high temperatures, and pressures of 200 psig. The digester is made of Type 316 ELC 20% stainless clad on ASTM A-212 Grade B firebox steel. To assure sound, long-life corrosion-resistant welds, three grades of Arcos CHROMEND Electrodes were used. All welding was manual. The resultant welds were completely free of micro fissures or cracks—more proof why Arcos weld metal is used so widely to combat destructive and costly corrosion. Write for an Arcos Stainless Application Chart. ARCOS CORPORATION, 1500 South 50th Street, Phila. 43, Pa.



ings up to 15 lbs. Introduced for the first time, at the show, the furnace has transformers and a vacuum pump which are enclosed in a compact cabinet. The furnace body, complete with electrode control housings, sits across the cabinet and rotates on four rollers. The vacuum chamber is of the bell jar type and clamps on the furnace body. It features a long life, quick change, composite crucible. This provides slag-free pours. To change the linings, the entire composite unit lifts out quickly and simply by pulling the



electrodes and removing the top flange. Accurate units require no ramming or fitting. (British Machines & Foundry Supplies, Ltd., Booth 2522.)

For more data circle No. 12 on postcard, p. 269

Nibbler

A new machine not only cuts all types of corrugated metals, but it also cuts these even if they have an asbestos or pitch coating. Clogging of the machine just doesn't happen. Tested under adverse conditions, the portable nibbler has run for hours, cleanly cutting pitch covered aluminum and stainless steel without clogging. Its simple punch and die operation gives it many advantages. Injury due to jagged edges is nonexistent since the nibbler cut leaves a finished, smooth edge. It is impossible for an operator's fingers to come in contact with the punch. This is because the punch sets well back in the nose block. Cut pieces of metal drop directly down; they

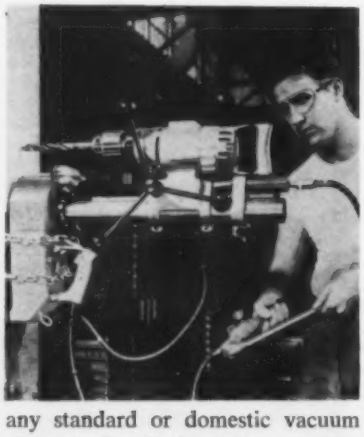


are not hurled or flipped at a tangent. Thus reduces chances of injury. (Fenway Machine Co., Booth 1741.)

For more data circle No. 13 on postcard, p. 269

Driller; Sander

A major electric-tool firm will demonstrate its new dustless belt sander at the show. Along with this also will be: (1) a new heavy-duty drum vacuum cleaner, which uses a standard 55-gal metal drum for high-capacity vacuum cleaning or material recovery; (2) magnetic drill presses in two capacities (¾ and 1¼ in.) which provide on-the-job drilling accuracy generally found in stationary equipment. The heavy-duty dustless belt sander attaches to



any standard or domestic vacuum cleaner. It eliminates more than 90 pct of paint dust and fine metal powder. And it does an effective sanding job. Dustlessness means long belt life, clean and healthful



MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES

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Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
E. W. Bliss Co., Canton and Toledo, Ohio
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
Continental Gin Co., Birmingham, Ala.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
Empire Pattern & Foundry Co., Tulsa, Okla. and Bonham, Texas
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg. Co., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundries, Inc., Chicago, Ill.
The Hamilton Foundry & Machine Co., Hamilton, Ohio
Hardinge Company, Inc., New York, N. Y.
Hardinge Manufacturing Co., York, Pa.
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Kennedy Van Saun Mfg. & Eng. Corp., Danville, Pa.
Koehring Co., Milwaukee, Wis.
Lincoln Foundry Corp., Los Angeles, Calif.
Nordberg Manufacturing Co., Milwaukee, Wis. and St. Louis, Mo.
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
The Prescott Co., Menominee, Mich.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Industries, Inc., Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Valley Iron Works, Inc., St. Paul, Minn.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario



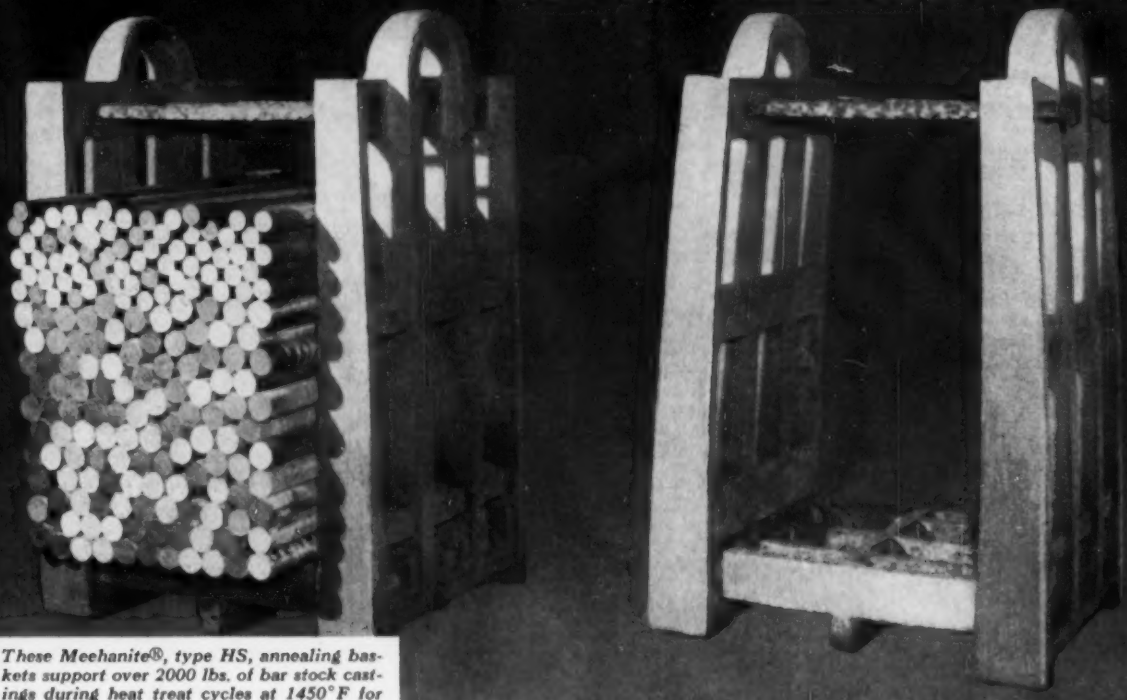
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BEHAVIOR OF CASTINGS AT ELEVATED TEMPERATURES — *BULLETIN TD-7*

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HEAT RESISTANCE



These Meehanite®, type HS, annealing baskets support over 2000 lbs. of bar stock castings during heat treat cycles at 1450°F for five hours without growth, scaling or premature cracking. They are made by Centrifugally Cast Products Div., the Shenango Furnace Co., Dover, Ohio.

Heat resisting Meehanite castings provide dependable service at high temperatures

Metal parts subjected to high temperatures undergo dimensional and structural changes which can lead to premature cracking or surface disintegration and scaling. These serious causes of failure can be avoided by selecting materials capable of withstanding the specific heat stresses involved.

The stabilized structure of Meehanite metal is particularly suitable for engineering applications where components must function dependably under steady or cyclic high temperature conditions.

This dependability of Meehanite® at elevated temperatures has led to its acceptance as a standard material for annealing pots, dies and fixtures, ingot molds, stoker parts, steel mill furnaces, smelting, cement and roasting furnaces, tube mill furnace rolls, incinerator liners, etc.

There are ten types of heat-resisting Meehanite metals available from which selection can be made according to conditions of service at high temperatures. For more detailed information write for a copy of our new, 4 page bulletin TD-7 — "Behavior of Castings At Elevated Temperatures" — or call the Meehanite foundry nearest you.



Test casting A, made from alloy gray iron was heat-treated for 300 hours at 1700°F in an oxidizing atmosphere. Severe growth and scaling is evident. Casting B, made from SC Meehanite® was given the same heat test. No growth or scaling occurred.

MEEHANITE BRIDGES THE GAP BETWEEN CAST IRON AND STEEL®

MEEHANITE METAL

MEEHANITE METAL CORPORATION, NEW ROCHELLE NEW YORK

working conditions. It also permits sanding in the same general area where painting is being done. (Black & Decker Mfg. Co., Booth 2621.)
For more data circle No. 14 on postcard, p. 269

Tool Chests

Tool chests on exhibit are designed especially to protect and preserve fine tools of machinists and tool and die makers. Both wood and metal chests make up the line; they come without tools or with three different assortments providing basic as well as more advanced precision measuring equipment. The metal chest is of rigidly reinforced steel. Measuring 20 x 8½ x 13¾ in. with a 19½ x 7¾ x 3¼ in. top compartment, it weighs 28 lb. Seven drawers have easy-action slides with positive no-fall-out stops plus spring clips allowing easy removal. Drawers and top compartment are lined



with red felt to protect fine tools. The front panel interlocks with the top for complete locking; it slides under the bottom drawer when open. (L. S. Starret, Booth 2546.)
For more data circle No. 15 on postcard, p. 269

Machining Steel

Fast machining steels on display at the show will include: carbon, alloy and stainless types. On exhibition also will be what is called the "best machining of all aluminum bar" stocks, and cast aluminum tooling plate. Rounding out the presentation will be free machining plastic bar and plate stock. This is widely used where corrosion resistance is a prime factor. The plastic material machines somewhat like brass. Leaded steel will actually be machined at extremely high speeds. (Joseph T. Ryerson & Son, Inc., Booth 411.)
For more data circle No. 16 on postcard, p. 269

Ultrasonic Tank

An ultrasonic products manufacturer will use a transparent tank at the exhibition to show exactly how ultrasonic energy cleans. Parts soiled with grease or even insoluble contaminants will be immersed. After turning on of power, soils will visibly explode off plastic and metal pieces without harming them. Within seconds, the parts will

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emerge from the tank sparkling and dirt-free. Energy for cleaning will come from a 500-w ultrasonic generator. Its high-frequency electrical pulses change into mechanical vibrations via a transducer mounted in the tank. These 38-kc vibrations cause cavitation, the rapid formation and sudden collapse of thousands of voids throughout the liquid; each acts as a tiny scrub brush. Even complicated mechanisms, blind holes, and deep crevices get cleaned thoroughly. (Branson Ultrasonic Corp., Booth 1110.)

For more data circle No. 17 on postcard, p. 269

Precision Casting

The developer of a precision casting technique will display a number of large precision castings with special emphasis on the air-



craft and missile field. Additionally, a number of various tool and die applications in "as cast" form, will be on exhibit. Among these will be: diecasting dies, plastic molds, hobs, milling cutters, forging dies, permanent molds, broaches, rubber molds, glass molds, shell mold master patterns, and many other tool steel castings which were previously machined from solid bars. (Shaw Process Development Corp., Booth 2522.)

For more data circle No. 18 on postcard, p. 269

Metal Powder

Evidence of the advantages of powder metallurgy will be seen at the exposition. A display of new metal powder components, from

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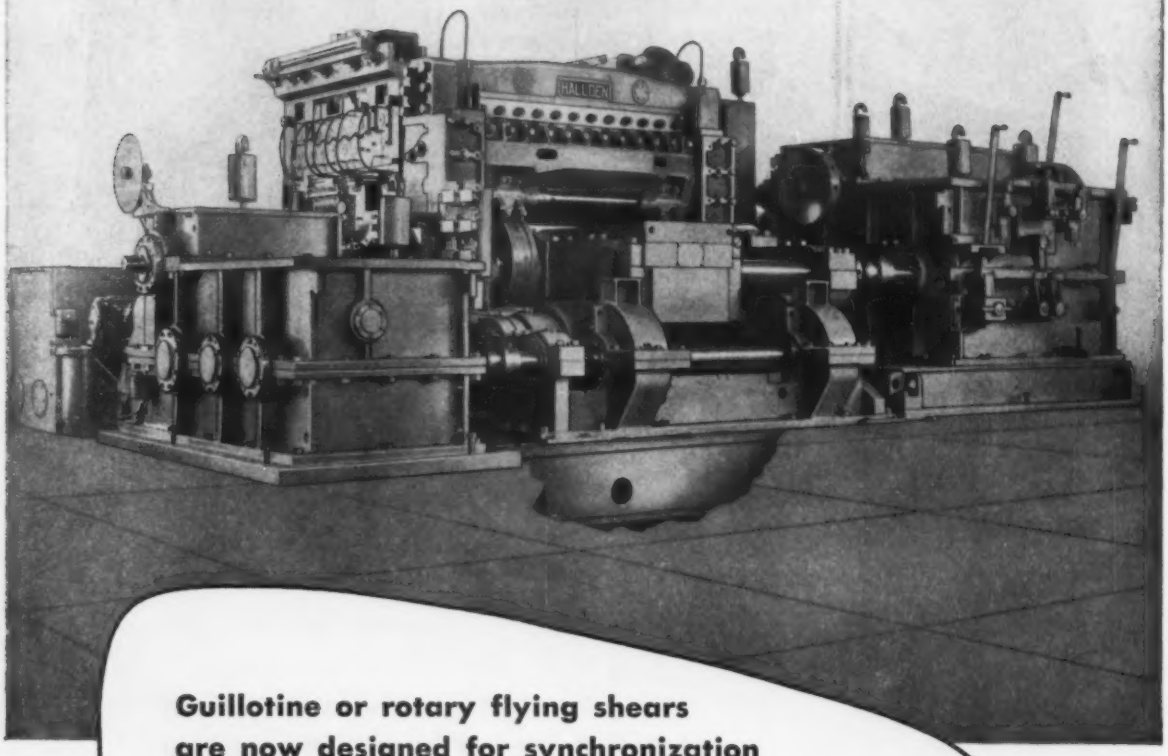
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An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished. ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by moden methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types —single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

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actual consumer and industrial products, will constitute the central focus of one exhibit. Powder metallurgy gears of almost every conceivable type and size will be a key feature of a case-history display. These include spur, bevel, face, cluster, partial, skip tooth, helical and many other types—furnished with single and multiple openings of various types and shapes, including tapers, counterbores, keys, keyways, splines, squares and eccentrics. (Metal Powder Industries Federation, Booth 421.)

For more data circle No. 19 on postcard, p. 269

Heat Treating

Specialized gas-fired heat processing equipment makes up another interesting show exhibit. A heating unit maker will demonstrate temperature uniformity attainable with high-production, short-cycle metal heating equipment. It will operate a model elevator-hearth furnace at



actual heat-treating temperatures (1600°F). Another "hot" exhibit, a large gas burner, will develop 100,000 to 300,000 Btu per hr at the show. This burner has full instrumentation showing uniform heat distribution and rapid response to control. A group of smaller burners will also be run, pointing up the wide variety of heating patterns possible with this type of heat release units. (Selas Corp. of America, Booth 1924.)

For more data circle No. 20 on postcard, p. 269

Diecastings

A unique case history display at the show consists of tiny, intricate diecastings made to extremely close tolerances. A key feature of the display is a "cost reduction clinic" exhibit. Built around a series of charts and photographs, this shows actual examples of redesign to diecasting from other techniques. It points out how cost savings result from redesign; functional and performance characteristics improve too, the case histories indicate. (Gries Reproducer Corp., Booth 550.)

For more data circle No. 21 on postcard, p. 269

STAINLESS COSTS LESS THAN ALUMINUM—



Do you know that the square-foot cost of stainless steel sheet for curtain wall panels is usually equal to or lower than aluminum when compared in thicknesses of equal indentation resistance? For example, Type 302 stainless steel, .022″ thick is equal to .051″ aluminum and costs only 62¢ per sq. ft., as compared to 67¢ per sq. ft. for 3003-H14 anodized aluminum.



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In the actual case shown, savings were pyramided through reduced inventory, handling, purchasing and production time; while one part was eliminated entirely.

To make this basic information available, Buffalo Bolt Company has drawn on over 100 years of experience to put together a digest of these principles.

You'll find them in our new booklet, "How to specify fasteners . . . and save". Filled with drawings and charts, it makes a handy guide in designing or buying any headed parts. If you can use a copy, write to North Tonawanda or ask a Field Representative.



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METALS SHOW

Metals Men Meet At Cleveland

Converging on Cleveland next week will be some 50,000 persons. They'll gather to attend meetings, discussions, and exhibitions on virtually every area in metalworking.

Technical presentations will exceed 150.

▪ With industrial activity again quickening and world events demanding more scientific progress, the coming 40th National Metal Exposition takes on added importance. To be staged at Cleveland on Oct. 27 to 31, this year's show boasts the theme: "Make It Better With Metals . . . For Less."

Nearly 500 exhibits will occupy some 300,000 sq ft of floor space in Cleveland's Public Auditorium with eight groups cooperating on technical presentations.

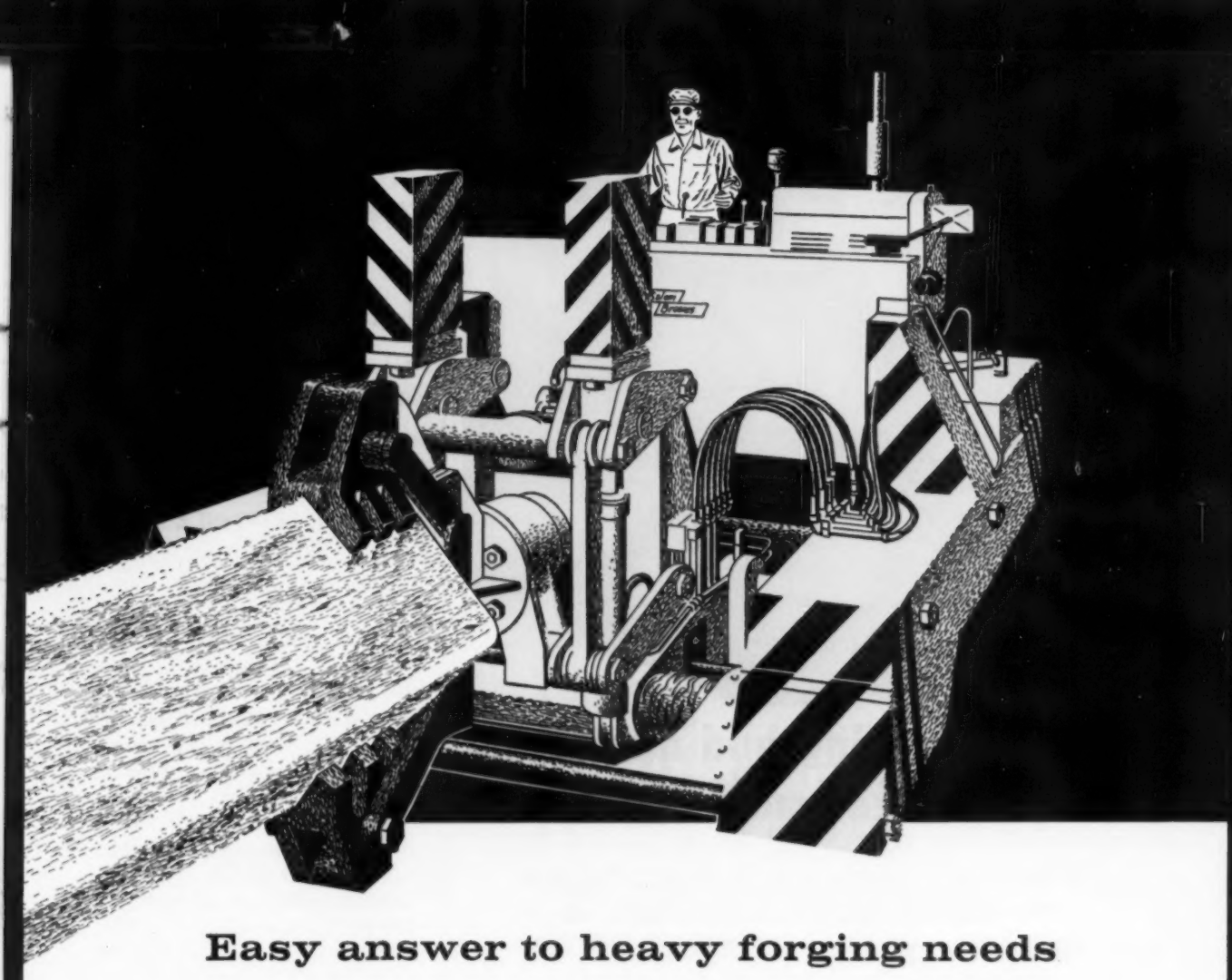
Show officials expect some 50,000 persons interested in various phases of metalworking to converge on Cleveland to attend technical sessions, scientific gatherings, and expositions of new processes and products.

150 Papers Ready — Approximately 150 scientific presentations are on schedule. Some 50 technical papers, plus 35 seminars, will be sponsored by the American Society for Metals alone.

Hours for the Metal Show in the Public Auditorium will be noon to 10:30 p.m., Monday, Tuesday and Wednesday, Oct. 27 to 29, and 10:00 a.m. to 6:00 p.m., Thursday and Friday, Oct. 30 and 31.

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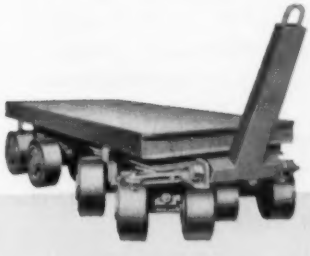
American Society for Metals ..... **P. 218**
Pre-show Seminar ..... **P. 218**
Technical Sessions ..... **P. 219**
Metals Engineering Conference ..... **P. 226**
Educational Lecture Course ..... **P. 263**
Institute of Metals Div., AIME ..... **P. 232**
Society for Nondestructive Testing ..... **P. 250**
Industrial Heating Equipment Assn. ..... **P. 259**
American Society for Testing Materials ..... **P. 259**
Metal Powder Industries Federation ..... **P. 260**
Metals Div., Special Libraries Assn. ..... **P. 262**
Metal Treating Institute ..... **P. 262**



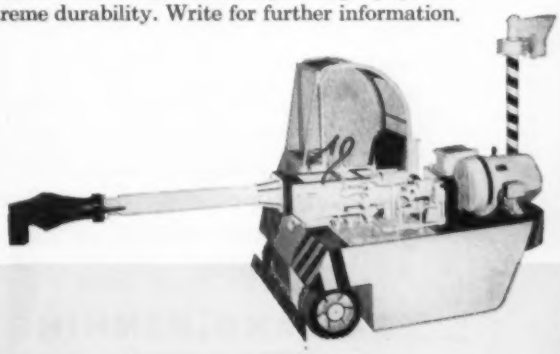
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This ruggedly-built machine meets the trend of industry toward hammer and press forging of high alloy, stainless and tool steels, and the many new extremely hard refractory-type alloys. The forging of these metals necessitates manipulating equipment of extreme durability. Write for further information.



Two other prominent members of the Salem-Brosius family of materials handling equipment are heavy-duty in-plant trailers (left) and the exclusive rubber-tired type furnace chargers shown at the right. Ask about them when you inquire about the manipulator.



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PROGRAM

AMERICAN SOCIETY FOR METALS

Pre-show Seminar

MAGNETIC PROPERTIES OF METALS AND ALLOYS

All sessions in the ballroom of the Statler-Hilton.

Sat., Oct. 25—9:00 a.m.

Presiding Officer: R. M. Bozorth, Bell Telephone Laboratories, Murray Hill, N. J.

Fundamental Questions in Magnetism, by J. H. VanVleck, Harvard University, Cambridge, Mass.

Experimental Measurements of Fundamental Magnetic Properties, by C. P. Bean, General Electric Research Laboratories, Schenectady, N. Y.

Nuclear Resonance in Magnetic Materials, by R. G. Shulman, Bell Telephone Laboratories, Murray Hill, N. J.

Sat., Oct. 25—2:00 p.m.

Presiding Officer: George Craig, University of Toronto, Toronto, Canada.

Ferromagnetic Domain Structure, by H. J. Williams and R. C. Sherwood, Bell Telephone Laboratories, Murray Hill, N. J.

Magnetic Behavior of Thin Films, by J. B. Goodenough, Lincoln Laboratories, Massachusetts Institute of Technology, Cambridge, Mass.

Magnetic Properties of Fine Particles, by T. O. Paine, General Electric Co., Instrument Dept., Boston, Mass.

Sat., Oct. 25—8:00 p.m.

Presiding Officer: J. J. Harwood, Metallurgy Branch, Office of Naval Research, Washington, D. C.

Time Effects in Magnetization,

by G. W. Rathenau, University of Amsterdam, Netherlands.

Sunday, Oct. 26—9:00 a.m.

Presiding Officer: M. E. Nicholson, Institute of Technology, University of Minnesota, Minneapolis, Minn.

Magnetostriction, by W. J. Carr, Jr., Westinghouse Research Laboratories, Pittsburgh, Pa.

Magnetomechanical Damping, by A. W. Cochardt, Westinghouse Research Laboratories, Pittsburgh, Pa.

Magnetic Properties and Temperature, by B. L. Averbach, Massachusetts Institute of Technology, Cambridge, Mass.

Sunday, Oct. 26—2:00 p.m.

Presiding Officer: R. L. Smith, Franklin Institute Laboratories, Philadelphia, Pa.

Magnetic Measurements in Metallurgy, by J. E. Goldman, Ford Motor Co., Scientific Laboratory, Dearborn, Mich.

Magnetic Annealing, by C. D. Graham, Jr., General Electric Research Laboratories, Schenectady, N. Y.

Metallurgical Structure and Magnetic Properties, by J. J. Becker, General Electric Research Laboratories, Schenectady, N. Y.

AMERICAN SOCIETY FOR METALS

Mon., Oct. 27—9:00 a.m.

Session held in Statler-Hilton Euclid Ballroom:

PRECIPITATION

Presiding Officers: H. Y. Hunsicker, Aluminum Co. of America; T. E. Leontis, Dow Chemical Co.

Unique Deformation and Aging Characteristics of Certain Magnesium-Base Alloys, by S. L. Couling, J. F. Pashak and L. Sturkey, Physical Metallurgy Section, Dow Chemical Co., Midland, Mich.

The Phenomenon of "Negative

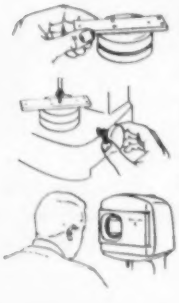


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PROGRAM

Creep" in Alloys, by R. W. Fountain and M. Korchynsky, Metals Research Laboratories, Electro Metallurgical Co., Niagara Falls, N. Y.

Aging Characteristics of Hastelloy B, by R. E. Clausing, P. Patriarca and W. D. Manly, Metallurgy Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.

The Response of an Iron-Base Alloy, Hardened With Titanium, to Various Aging Times and Temperatures, by T. W. Eichelberger, Research Laboratories, Westinghouse Electric Corp., Pittsburgh, Pa.

Mon., Oct. 27—9:00 a.m.

Session held in Statler-Hilton Grand Ballroom:

DIFFUSION AND GROWTH

Presiding Officers: J. E. Dorn, University of California; W. C. Winegard, University of Toronto

Preparation of FeO, NiO and CoO Crystals by Halide Decomposition, by R. E. Cech and E. I. Alessandrini, Metallurgy and Ceramics Research Dept., General Electric Co., Schenectady, N. Y.

Spiral Growth During Vapor Deposition of Cadmium, by W. I. Pollock, E. I. du Pont de Nemours & Co., Wilmington, Del., and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, Pa.

Solid State Diffusion and the Motion of Phase Boundaries, by D. D. Van Horn, General Electric Co., Cleveland, O.

Diffusion Layer Formation in the Ternary System Aluminum-Magnesium-Zinc, by J. B. Clark, Dow Chemical Co., Midland, Mich., and F. N. Rhines, Carnegie Institute of Technology, Pittsburgh, Pa.

Growth Conditions for Equi-Axed Crystals in Aluminum-Magnesium Alloys, by T. S. Plaskett and W. C. Winegard, Dept. of Metallurgical Engineering, University of Toronto, Canada.

Mon., Oct. 27—2:00 p.m.

Session held in Statler-Hilton Grand Ballroom:

HIGH-TEMPERATURE METALS

Presiding Officers: J. H. Bechtold, Westinghouse Electric Corp.; W. D. Manly, Oak Ridge National Laboratory

An X-Ray Metallographic Study of Arc-Cast Tungsten, by S. Leber, General Electric Co., Cleveland, O.

Temperature and Stress Dependence of the Atmosphere Effect on a Nickel-Chromium Alloy, by P. Shahinian and M. R. Achter, High-Temperature Alloys Branch, U. S. Naval Research Laboratory, Washington, D. C.

Studies of the Oxidation and Contamination Resistance of Binary Columbium Alloys, by C. T. Sims, W. D. Klopp and R. I. Jaffee, Battelle Memorial Institute, Columbus, O.

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SUPERIOR CASTINGS, LONGER DIE LIFE ATTRIBUTED TO 'DAG' DISPERSIONS

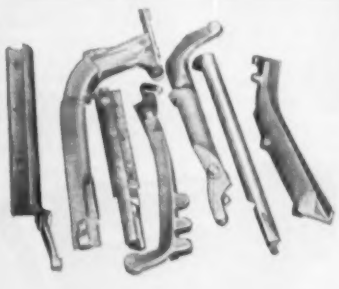
Die casters and molders are expressing a growing preference for Acheson 'dag' brand colloidal dispersions. The consistent high quality of these products and the multiple benefits they offer have obsoleted most other mold cavity coatings. As outlined below, Acheson dispersions greatly aid in the manufacture of more uniformly sound castings having smoother surface finishes, facilitate metal flow and parting, and consequently extend the effective service lives of the dies and molds on which they are used.



Acheson 'Prodag'®, spray-applied on permanent molds at Paragon Aluminum Corporation, has given them consistently higher quality castings and fewer rejects.

Better surface finish with 'Prodag' permanent mold coating is just one of the reasons why Paragon Aluminum Corporation, a Division of Detroit Harvester Company located at Monroe, Michigan, switched to this Acheson product. After four years of experimentation with other mold washes, Paragon chose 'Prodag' — Acheson semi-colloidal graphite in water — and has used it constantly the past seven years. The reasons for its choice are these; uniform consistency, excellent heat-transfer quality, and its hard, smooth, tenacious film which resists flaking and provides easier parting characteristics.

With about 95 per cent of its annual output of more than two million pounds of castings going to the automotive industry, Paragon must insist upon quality. 'Prodag' helps to maintain this standard. These parts for convertible automobile tops are precision-molded from both 355 and 319 aluminum alloy. Molds are preheated before each day's run to 600°F and the casting cycle maintains this temperature. The 'Prodag' dilution ratio is 1 to 4 parts water and is applied to the molds with a commercial spray gun. Aside from occasional touchup at points of greatest wear, this coating lasts through the entire run. Because of the physical contours involved in these comparatively small, light castings, they require rapid cooling in certain areas to insure uniform strength. The 'Prodag' coating — with its proven fast heat transfer ability — allows the castings to cool without breaks or pinholes. And by parting more easily, the high-finish castings which result have given Paragon Aluminum products wide acceptance in this demanding industry.



Typical parts cast at Paragon Aluminum include these automobile convertible top braces. More uniform strength, better finish, and fewer rejects result from this company's use of Acheson 'Prodag'.

Colloidal graphite increases die life because of its stability at high temperatures, excellent lubricating qualities, and its ability to prevent adhesion and the scrubbing effect of hot metal. This cannot be said of conventional petroleum compounds which either decompose rapidly at temperatures above 300°F or do not possess the required lubricity necessary under good die casting procedures. It will not volatilize when in contact with the hot metal and cause pock marks due to gas formation. It will perform when present in extremely thin films which will not affect dimensions or cause discoloration of the parts being cast. And since it does not volatilize or otherwise be destroyed in the casting process, it does not need to be applied as often as other lubricants. This fact alone has often increased production as much as 25%. Investigate the use of an Acheson colloidal dispersion in solving your die casting problem . . . *It probably is the very answer you need.*

If you have a metal casting problem, call in your Acheson Service Engineer. Or if you prefer, write direct for additional information contained in our Bulletin No. 425. Address Dept. IA-108.

'dag' and 'Prodag' are trademarks registered in the U.S. Patent Office by Acheson Industries, Inc.

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PROGRAM

Tues., Oct. 28—9:00 a.m.

Session held in Statler-Hilton Grand Ballroom:

STEEL—I

Presiding Officers: G. H. Enzian, Jones & Laughlin Steel Corp.; S. L. Gertsman, Dept. of Mines & Technical Surveys, Ottawa

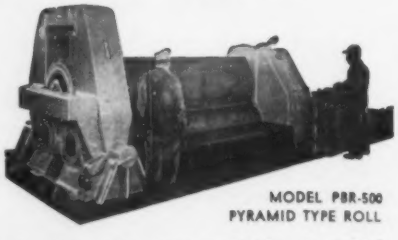
Mechanical Properties of Fe-Al-Si Alloys at Room and Elevated Temperatures, by D. J. Schmatz and V. F. Zackay, Physical Metallurgy Section, Ford Motor Co., Dearborn, Mich.

Recrystallization, Structure and Hardness of Low-Carbon Steels Containing up to 1% Copper, by R. L. Rickett and W. C. Leslie, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp., Monroeville, Pa.

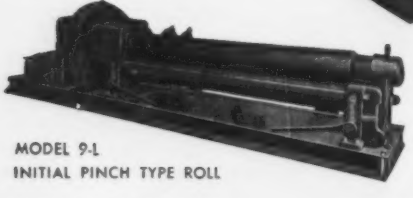
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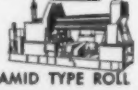


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Multiplying Factors for the Calculation of Hardenability of Hypereutectoid Steels Hardened From 1700° F., by C. F. Jatczak and D. J. Girardi, Timken Roller Bearing Co., Canton, O.

Effect of Copper on the Heat Treating Characteristics of Medium-Carbon Steel, by R. A. Grange, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp., Monroeville, Pa., V. E. Lambert, Westinghouse Electric Co., Lamp Div., Bloomfield, N. J., and J. J. Harrington, U. S. Steel Corp., Gary, Ind.

Tues., Oct. 28—9:00 a.m.

Session held in Statler-Hilton Ohio Room:

MECHANICAL PROPERTIES

Presiding Officers: R. D. Chapman, Chrysler Corp.; W. T. Lankford, U. S. Steel Corp.

The Relationship Between Weld-Cracking and Alloy Constitution in Some Binary and Ternary Magnesium Alloys, by C. L. Kobrin and R. A. Dodd, School of Metallurgican Engineering University of Pennsylvania, Philadelphia.

Stress Effects of Abrasive Tumbling, by H. R. Letner, Large Lamp Dept., General Electric Co., Cleveland, O.

Thermal and Mechanical Fatigue of Nickel and Titanium, by Harry Majors, Jr., School of Engineering, Seattle University, Wash.

A Compilation and Interpretation of Cyclic Strain Fatigue Tests on Metals, by J. F. Tavernelli and L. F. Coffin, Jr., Metallurgy and Ceramics Research Dept., General Electric Co., Schenectady, N. Y.

Tues., Oct. 28—2:00 p.m.

Session held in Statler-Hilton Grand Ballroom:

STEEL—II

Presiding Officers: D. J. Girardi, Timken Roller Bearing Co.; O. O. Miller, International Nickel Co.

The Mechanism of the Allotropic

Transformation in High-Purity Iron, by E. Eichen and J. W. Spretnak, Dept. of Metallurgical Engineering, Ohio State University, Columbus, O.

Mechanical Properties of Deformed Metastable Austenitic Ultra-High-Strength Steel, by D. J. Schmatz and V. F. Zackay, Physical Metallurgy Section, Ford Motor Co., Dearborn, Mich.

Austenite Transformation and Incubation in an Alloy Steel of Eutectoid Carbon Content, by R. A. Grange, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp., Monroeville, Pa., P. T. Kilhefner, Jr., and T. P. Bittner, U. S. Steel Corp., Duquesne, Pa.

Magnetic Analysis of Phase Changes Produced in Tempering a High-Carbon Steel, by M. Mentser, Bureau of Mines, U. S. Dept. of the Interior, Pittsburgh.

A Simplified Procedure for Calculating Peak Position in X-Ray Residual Stress Measurements on Hardened Steel, by D. P. Koistinen and R. E. Marburger, Research Staff, General Motors Corp., Detroit, Mich.

Wed., Oct. 29—2:00 p.m.

Session held in Statler-Hilton Grand Ballroom:

BRITTLE FRACTURE

Presiding Officers: M. Cohen, Massachusetts Institute of Technology; J. F. Libsch, Lehigh University.

Cleavage Step Formation in Brittle Fracture Propagation, by J. M. Berry, Metallurgy and Ceramics Research Dept., General Electric Co., Schenectady, N. Y.

Low-Temperature Embrittlement of Austenitic Cr-Mn-N-Fe Alloys, by F. W. Schaller, Metallurgy Dept., Case Institute of Technology, Cleveland, O., and V. F. Zackay, Physical Metallurgy Section, Ford Motor Co., Dearborn, Mich.

The Transition Temperature in a Notched Bar Impact Test, by J. A. Hendrickson, California Research Corp., La Habra, Calif., D. S. Wood, and D. S. Clark, California Institute of Technology, Pasadena, Calif.

Effect of Grain Size and Carbon Content on the Yield Delay Time of Mild Steel, by J. M. Krafft and A. M. Sullivan, Ballistics Branch, U. S. Naval Research Laboratory, Washington, D. C.

Some Low-Temperature Observations of 1020 Steel, by F. S. Deronja and M. Gensamer, Columbia University, School of Mines, New York, N. Y.

Wed., Oct. 29—2:00 p.m.

Session held in Statler-Hilton Euclid Ballroom:

URANIUM

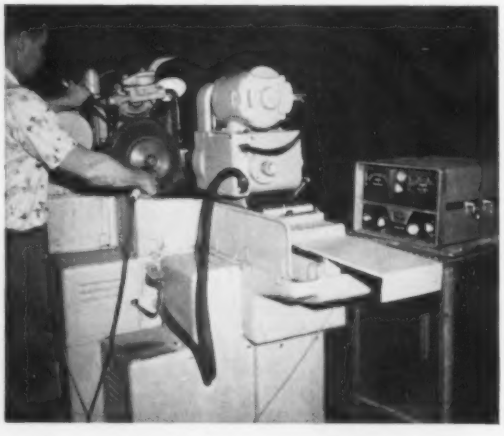
Presiding Officers: E. C. Miller, Oak Ridge National Laboratory;



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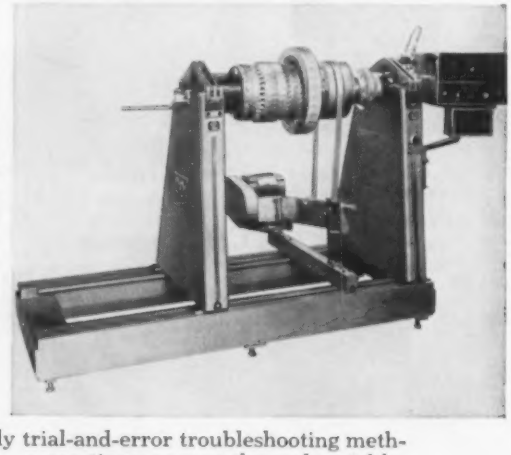
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PROGRAM

J. F. Schumar, Argonne National Laboratory.

Transformation Kinetics of Beta Plutonium, by R. D. Nelson, Hanford Atomic Products Operation, General Electric Co., Richland, Wash.

Transformation Characteristics of Dilute Ternary Alloys of Uranium, by D. J. Murphy, Dept. of Metallurgy, University of Arizona, Tucson, Ariz.

The Mechanical Properties and Heat Treatment Response of Zirconium-Uranium Alloys, by W. Chubb and F. A. Rough, Battelle Memorial Institute, Columbus, O.

Preparation of Uranium and Uranium Alloy Powder Metal Compacts, by Herbert S. Kalish, Sylvania-Corning Nuclear Corp., Bayside, N. Y.

Properties of As-Cast and Heat Treated 2% Molybdenum-Uranium, by E. G. Zukas, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.

Thurs., Oct. 30—9:00 a.m.

Session held in Statler-Hilton Euclid Ballroom:

TITANIUM—I

Presiding Officers: W. R. Opie, National Lead Co.; W. Rostoker, Armour Research Foundation.

The Application of Rate Process Theory to the Heat Treatment of Titanium Alloys, by N. M. Erkun, Fundamental Research Section, Crucible Steel Co. of America, Midland, Pa.

The Effects of Microstructure and Heat Treatment on the Hydrogen Embrittlement of Alpha-Beta Titanium Alloys, by D. N. Williams, F. R. Schwartzberg and R. I. Jaffee, Battelle Memorial Institute, Columbus, O.

The Effect of Composition on the Hydrogen Embrittlement of Alpha-Beta Titanium Alloys, by R. I. Jaffee and D. N. Williams, Battelle Memorial Institute, Columbus, O.

Hydrogen Embrittlement and Delayed Failure in Titanium Alloys, by R. D. Daniels, University of Oklahoma, Norman, R. J. Quigg and A. R. Troiano, Dept. of Metallurgical Engineering, Case Institute of Technology, Cleveland, O.

The Corrosion Pyrophoricity and Stress Corrosion Cracking of Titanium Alloys in Fuming Nitric Acid, by J. B. Rittenhouse, Jet Propulsion Laboratory, California Institute of Technology, Pasadena.

Thurs., Oct. 30—9:00 a.m.

Session held in Statler-Hilton Grand Ballroom:

CREEP

Presiding Officers: R. W. Guard, General Electric Co.; W. A. Reich, General Electric Co.

The Activation Energies for Creep of Polycrystalline Copper and Nickel, by P. R. Landon, J. L. Lytton, L. A. Shepard and J. E. Dorn, Dept. of Engineering, University of California, Berkeley.

A Procedure for Application of Time-Temperature Parameters to Accelerated Creep Rupture Testing, by S. S. Manson, G. Succop and W. F. Brown, Jr., N.A.C.A., Lewis Flight Propulsion Laboratory, Cleveland, O.

Effect of Strain Rate and Temperature on the Compressive Flow Stresses of Three Titanium Alloys, by A. J. Griest, A. M. Sabroff and P. D. Frost, Light Metals Div., Battelle Memorial Institute, Columbus, O.

Temperature and Rate Dependence of Strain Hardening in the Aluminum Alloy 2024-0, by D. S. Fields, Jr., Aluminum Co. of America, New Kensington, Pa., and W. A. Backofen, Metals Processing Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

Thurs., Oct. 30—2:00 p.m.

Session held in the Statler-Hilton Euclid Ballroom:

Ask Standard

how to cut costs with conveyors



Standard limit-switch-controlled Automatic Reciprocator is one of two used to form 200-ft. overhead detour of dehumidifier assembly line.

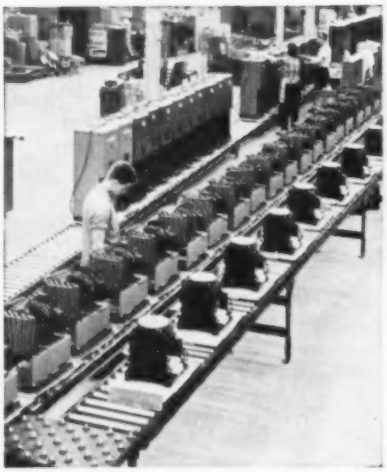
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PROGRAM

TITANIUM—II

Presiding Officers: E. M. Mahla, E. I. du Pont de Nemours & Co.; P. G. Nelson, The Budd Co.

Microstructure and Mechanical Properties of Ti-Cu-Al and Ti-Cu-Al-Sn Alloys, by R. F. Bunshah and H. Margolin, College of Engineering, New York University, New York, N. Y.

Effect of Heat Treatment on the Elevated Temperature Stress Stability of Titanium Alloys, by M. L. Greenlee, G. A. Lenning, W. M. Parris and H. D. Kessler, Titanium Metals Corp. of America, Henderson, Nev.

The Influence of Forging Temperature in Mechanical Properties of Al-V-Ti Alloys, by L. S. Coran and F. J. Rizzitano, Watertown Arsenal Laboratories, Watertown, Mass.

A Contribution to the Hardenability Problem in Titanium Alloys, by R. P. Elliott and W. Rostoker, Metals Research Dept., Armour Research Foundation of Illinois Institute of Technology, Chicago.

The Effect of Stress on the Eutectoid Decomposition of Titanium-Chromium Alloys, by A. W. Goldenstein, A. G. Metcalfe and W. Rostoker, Metals Research Dept., Armour Research Foundation of Illinois Institute of Technology, Chicago.

AMERICAN SOCIETY FOR METALS—METALS ENGINEERING CONFERENCES

Mon., Oct. 27—9:00 a.m.

Session held in Hotel Cleveland Cleveland Room:

FABRICATION OF MOLYBDENUM—I

Chairman: A. J. Levy, Materials and Process Section, Marquardt Aircraft Co., Van Nuys, Calif.

Molybdenum as a Structural Alloy, by J. J. Harwood, Metallurgy Branch, Office of Naval Research, Washington, D. C.

Production of Quality Molybdenum Mill Products, by W. L. Bruckart, Universal Cyclops Steel Corp., Bridgeville, Pa.

Forming Molybdenum Sheet, by D. C. Goldberg, Aviation Gas Turbine Division, Westinghouse Electric Corp., Kansas City, Mo.

Mon., Oct. 27—2:00 p.m.

Session held in Hotel Cleveland, Cleveland Room:

FABRICATION OF MOLYBDENUM—II

Chairman: G. A. Timmons, Climax Molybdenum Co. of Michigan, Detroit.

Fusion Welding Molybdenum, by D. C. Martin, Metal Joining Div.,

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PROGRAM

Battelle Memorial Institute, Columbus, O.

Brazing Molybdenum, by G. S. Hoppin, III, Aircraft Gas Turbine Div., General Electric Co., Cincinnati, O.

Machining of Molybdenum, by W. A. Taebel and J. Gelok, Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J.

Protective Coating Systems for Molybdenum, by R. I. Jaffee, Division of Nonferrous Metallurgy, Battelle Memorial Institute, Columbus, O.

Tues., Oct. 28—9:00 a.m.

Session held in Hotel Cleveland, Wedgewood Room:

QUENCHING OF STEELS—I

Chairman: O. W. McMullan, Federal - Mogul - Bower Bearings Inc., Detroit, Mich.

The How and Why of Quenching, by C. A. Siebert, University of Michigan, Ann Arbur, Mich.

Quenching, Thermal Process, by V. Paschkis, and G. Stolz, Jr., Heat and Mass Flow Analyzer Laboratory, Columbia University, New York, N. Y.

Evaluation of Quenching Media, by G. H. Robinson, Met. Engineering Dept. Research Staff, and H. J. Gilliland, Process Development, General Motors Corp., Detroit, Mich.

Tues., Oct. 28—9:00 a.m.

Session held in Hotel Cleveland, Cleveland Room:

PRECISION MECHANICAL SPRINGS—DESIGN AND PERFORMANCE

Chairman: George F. Meyer, International Harvester Co., Rock Falls, Ill.

Types of Springs in General Use, by J. B. Beckwith, Wallace Barnes Div., Associated Spring Corp., Bristol, Conn.

Role of Stress in Spring Performance, by A. M. Wahl, Research Laboratories, Westinghouse Electric Corp., Pittsburgh, Pa.

Behavior of Springs at Elevated Temperatures, by W. R. Johnson, Associated Spring Corp., Bristol, Conn.

Spring Materials, by Lem Kulze, Gibson Division, Associated Spring Corp., Chicago, Ill.

Tues., Oct. 28—2:00 p.m.

Session held in Hotel Cleveland Wedgewood Room:

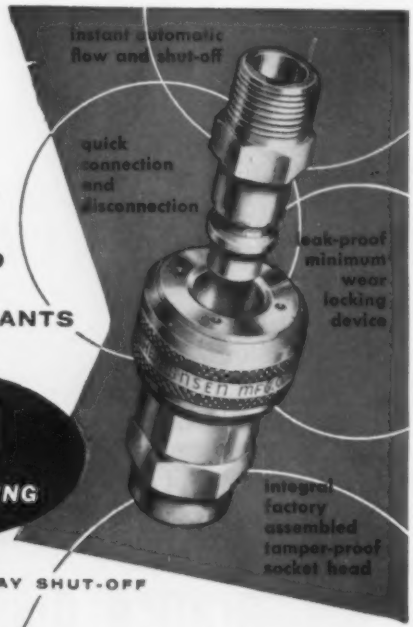
QUENCHING OF STEELS—II

Chairman: T. A. Frischman, Axle Division, Eaton Mfg. Co., Cleveland, O.

Hot Quenching, William Hiatt, International Harvester Co., Ft. Wayne, Ind.

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Automatic Quenching Equipment, by O. E. Cullen, Research and Development, Surface Combustion Corp., Toledo, O.

Wed., Oct. 29—9:00 a.m.

Session held in Hotel Cleveland Wedgewood Room:

MODERN MACHINING METHODS—I

New Cutting Tool Materials, by R. T. Hook, Warner & Swasey Co., Cleveland, O.

Constant Speed Machining, by M. C. Shaw, Metals Processing Div., Massachusetts Institute of Technology, Cambridge, Mass.

Quick Change, Preset Tooling, by A. S. Rogers, Wesson Co., Ferndale, Mich.

Wed., Oct. 29—2:00 p.m.

Session held in Hotel Cleveland Wedgewood Room:

MODERN MACHINING METHODS—II

Chairman: F. W. Boulger, Battelle Memorial Institute, Columbus, O.

Trends in High-Speed Equipment, by M. S. Curtis, Warner & Swasey Co., Cleveland, O.

Chipless Machining, by R. D. Halverstadt and R. Cogan, Aircraft Gas Turbine Div., General Electric Co., Cincinnati, O.

Machining High-Strength Materials, by F. G. Fenger and R. W. Runyan, Menasco Manufacturing Co., Burbank, Calif.

Machining of Molybdenum, by H. J. Siekman, and L. A. Sowinski, Metallurgical Products Dept., General Electric Co., Detroit, Mich.

Wed., Oct. 29—2:00 p.m.

Session held in Hotel Cleveland Whitehall Room:

DESIGN AND SPECIFICATION FOR HIGH-QUALITY CASTINGS

Aircraft and Missiles, by Mrs. Rebecca H. Sparling, Convair-Pomona Div., Pomona, Calif.

Petroleum Refining Industry, by N. J. Rees and R. W. Manuel, Refinery Engineering Div., Socony Mobil Oil Co., Inc., New York, N. Y.

Railroads, by W. R. Elsey, Pennsylvania Railroad Co., Philadelphia, Pa.

Machine Tools, by Herbert Whitney, Kearney & Trecker Corp., Milwaukee, Wis.

Thurs., Oct. 30—9:00 a.m.

Session held in Hotel Cleveland Whitehall Room:



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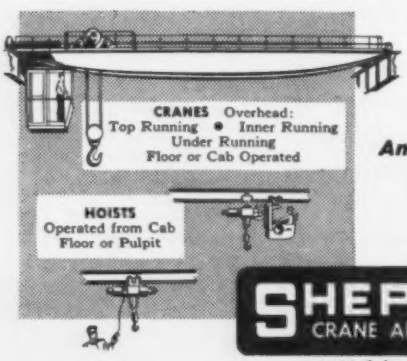
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PROGRAM

METALS AND FABRICATION METHODS FOR HIGH-PRESSURE APPLICATIONS

Special Materials Problems in High-Pressure Applications, by Donald S. Nulk, Jet Div., Thompson Products, Inc., Cleveland, O.

Ultra-High Strength Pressure Vessels in the Missiles Field, by W. S. Tenner, Aerojet-General Corp., Azusa, Calif.

New Welding Techniques in Pressure Vessels, by R. E. Lorentz, Jr., C. T. Ward and W. B. Bunn, Met. Division, Combustion Engineering, Inc., Chattanooga, Tenn.

Thurs., Oct. 30—9:00 a.m.

Session held in Hotel Cleveland Wedgewood Room:

HIGH-VELOCITY FORMING

Chairman: John Dorn, University of California, Berkeley, Calif.

High-Energy Rate Forming by Machine, by J. B. Ottestad, Hyge Machines, Convair, San Diego, Calif.

Explosive Forming Under Water, by E. W. Feddersen, Convair, Ft. Worth, Tex.

Explosive Forming by Direct Application, by A. H. Petersen, Lockheed Aircraft Corp., Burbank, Calif.

Thurs., Oct. 30—2:00 p.m.

Session held in Hotel Cleveland Wedgewood Room:

THE METALLURGIST LOOKS AT NONMETALLIC MATERIALS

Plastics, by K. F. Charter, Plastic Research Dept., A. O. Smith Corp., Milwaukee, Wis.

Ceramics, speaker to be announced, Ceramics for Industry, Mineola, N. Y.

Cermets, by Malcolm F. Judkins, New Product Development, Firth Sterling, Inc., Pittsburgh, Pa.



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PROGRAM

INSTITUTE OF METALS DIVISION—AMERICAN INSTITUTE OF MINING, METALLURGICAL AND PETROLEUM ENGINEERS

All sessions held in the Carter Hotel:

Mon., Oct. 27—9:00 a.m.

Session held in the Lorenzo Carter Room:

SYMPOSIUM ON POINT IMPERFECTIONS

Irradiation Damage and Point Imperfections, J. W. Corbett, General Electric Co.

Internal Friction and Point Imperfections, C. A. Wert, Univ. of Illinois.

Thermal Treatment and Point Imperfections, A. S. Nowick, I.B.M. Watson Lab., Columbia U.

Session held in the Oak Room:

GENERAL METALLURGY

Freezing of Liquid Metal in a Mold, G. Horvay, J. G. Henzel, General Electric Co.

Gas Desorption of Nickel Powders, J. F. Watson, Convair Research Labs., M. J. Sinnott, Univ. of Michigan.

Hydrogen in Cold Worked Iron-Carbon Alloys and the Mechanism of Hydrogen Embrittlement, M. L. Hill, E. W. Johnson, Westinghouse Electric Corp.

Aging of Hydrogen Charged Steel, H. C. Rogers, G. E. Co.

Fatigue in Single Crystals of Copper, M. L. Ebner, W. A. Backofen, Massachusetts Institute of Technology.

Hardening Characteristics of Polycrystalline Copper Under Fatigue Loading, M. L. Ebner, W. A. Backofen, M.I.T.

Reduction of Nickel Oxide, R. E. Cech, G. E. Co.

Nucleation of Whiskers Formed by Reduction of Nickel Bromide, R. E. Cech, G. E. Co.

Session held in the Embassy Room:

OXIDATION AND MECHANICAL PROPERTIES

Oxide Particle Dispersions in Internally Oxidized Copper-Aluminum Alloys, D. L. Wood, G. E. Co.

Mechanical Properties of Internally Oxidized Copper-Aluminum Alloys, D. L. Wood, G. E. Co.

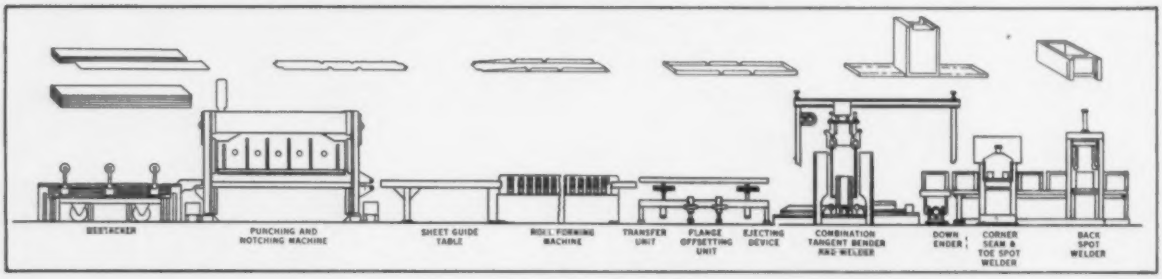
Recrystallization of Internally Oxidized Copper-Aluminum Alloys, D. L. Wood, G. E. Co.

Strengthening of Copper Alloys by Internal Oxidation, M. S. Ali and V. A. Phillips.

Effect of Oxygen on the Tensile Properties of Titanium, C. Feng, C. Elbaum and W. C. Winegard, Univ. of Toronto.

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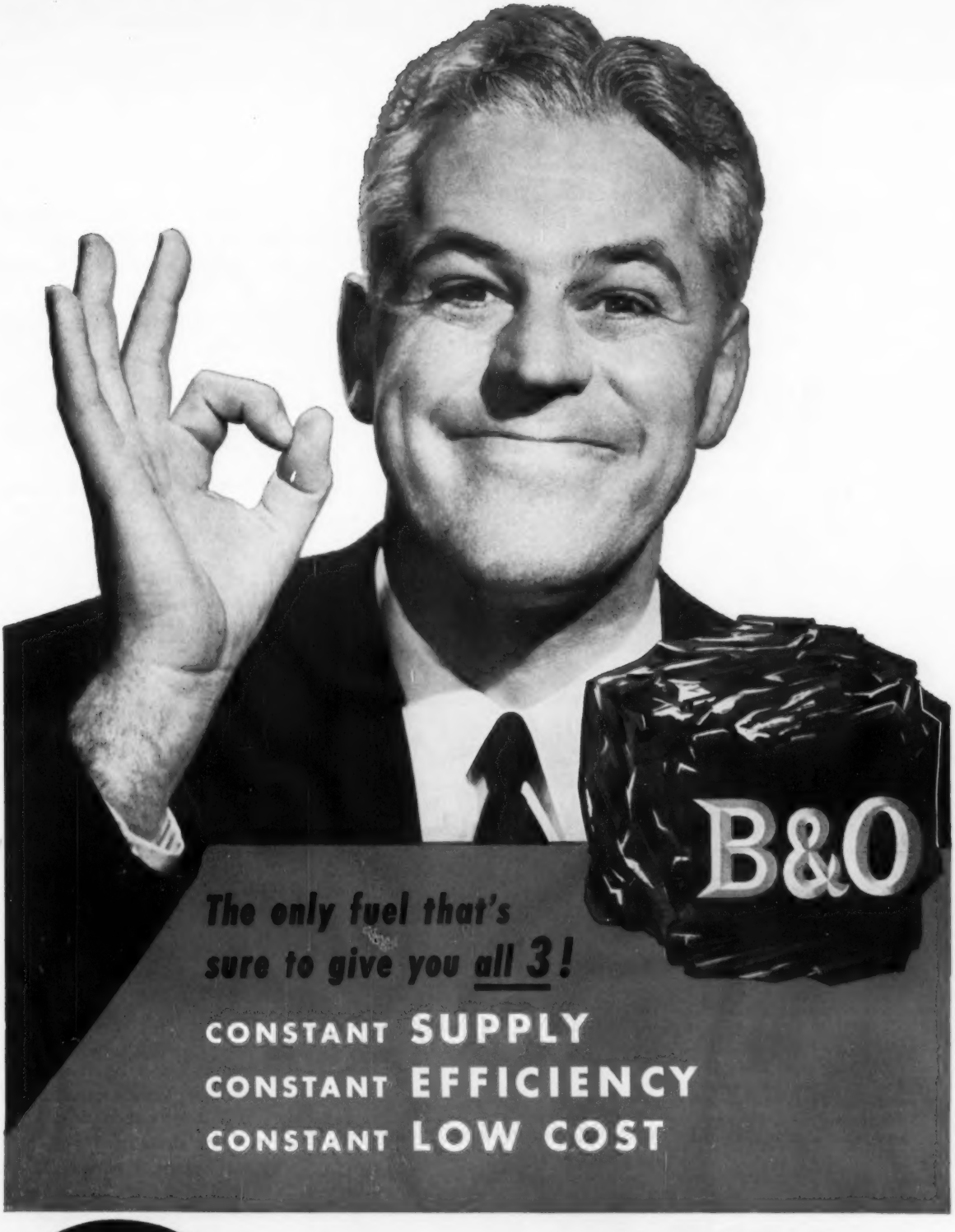
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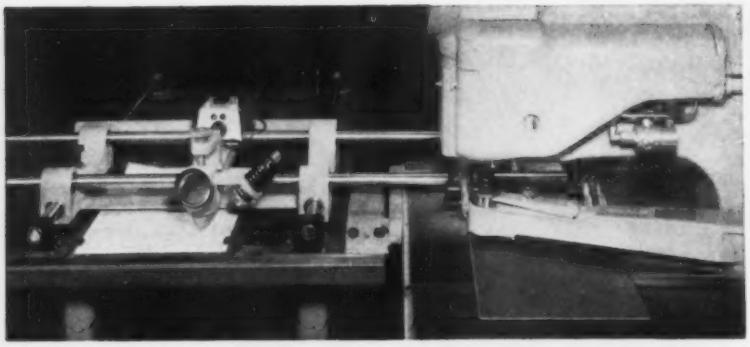
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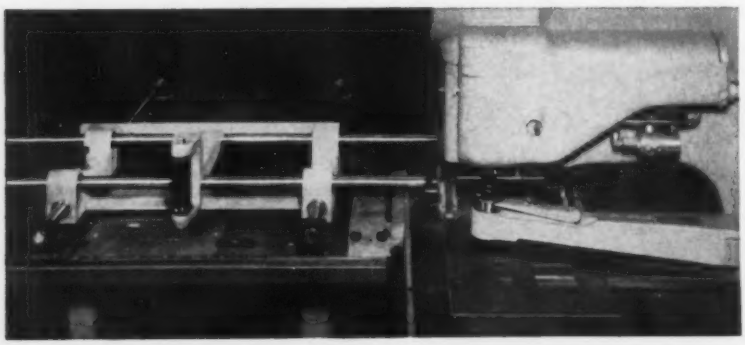


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PROGRAM

Role of Oxide Plasticity in the Oxidation Mechanism of Pure Copper, J. A. Sartell, R. J. Stokes, S. H. Bendel, T. L. Johnston, C. H. Li, Minneapolis - Honeywell Regulator Co.

Initial Oxidation Rate of Nickel and Effect of the Curie Temperature, H. Uhlig, J. Pickett, J. MacNairn, M.I.T.

Session held in the Lorenzo Carter Room:

SYMPOSIUM ON GOVERNMENT-SPONSORED RESEARCH ON SEMICONDUCTOR METALLURGY

Industrial Impact of Transistors, J. A. Morton, Bell Telephone Labs.

Review of Armed Services Activities, W. R. Cherry, Evans Signal Lab., U. S. Army; R. Cornelissen, Air Force Cambridge Research Center, Paul Egli, Naval Research Lab.

Mon., Oct. 27—2:00 p.m.

Session held in the Hotel Ballroom:

SYMPOSIUM ON EFFECT OF ORDERING ON MECHANICAL PROPERTIES

Deformation Characteristics of Superlattices, P. A. Flinn, Westinghouse Electric Corp.

Deformation and Annealing of the Alloy Cu3Au, J. B. Cohen, B. Roessler and M. B. Bever, M.I.T.

Effect of Order on the Plastic Behavior of Iron-Aluminum Alloy, F. X. Kayser, Ford Motor Co.

Effect of Ordering on the Mechanical Properties of Beta Brass, N. Brown, Univ. of Pennsylvania, M. Herman, Franklin Institute.

Anneal Hardening in Aluminum Bronze, R. W. Cahn, S. Chinowsky, R. G. Davies, Univ. of Birmingham, England.

Ordering and Creep Properties, of Iron-Aluminum Alloys, A. Law-



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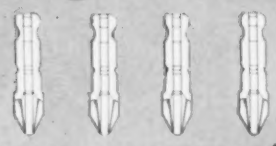
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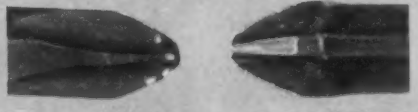
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ley, Univ. of Pennsylvania, R. W. Cahn, Univ. of Birmingham, England.

Session held in the Lorenzo Carter Room:

ANNEALING OF METALS

Effect of Atmosphere on Secondary Recrystallization in High-Purity Silicon-Iron, J. L. Walter, C. G. Dunn, G. E. Co.

Initial Growth Behavior of a Secondary Recrystallization Cube-Oriented Nucleus, C. G. Dunn, J. L. Walter, G. E. Co.

Secondary Recrystallization in Silicon-Iron, J. E. May, D. Turnbull, G. E. Co.

Tertiary Recrystallization in Silicon-Iron, J. L. Walter and C. G. Dunn, G. E. Co.

On the Determination of Preferred Orientations, C. G. Dunn, G. E. Co.

Temperature Dependence of Preferred Orientation in Rolled Tungsten, J. W. Pugh, G. E. Co.

X-Ray Diffraction Study of the Perfection of Aluminum and Copper Crystals Grown in the Solid State, M. N. Parthasarath, P. A. Beck, Univ. of Illinois.

Annealing of Point Defects in Cold Worked Tungsten and the Influence of Impurities on the Kinetics, L. A. Neimark, Argonne National Lab., R. A. Swalin, Univ. of Minnesota.

Temperature Dependence of Grain Boundary Migration in High-Purity Lead Containing Small Additions of Tin, K. T. Aust, J. W. Rutter, G. E. Co.

Session held in the Oak Room:

EQUILIBRIUM AND MICROSTRUCTURES

Zirconium and Hafnium Phases Isostructural With Ti2Ni, M. V. Nevitt, L. H. Schwartz, Argonne National Lab.

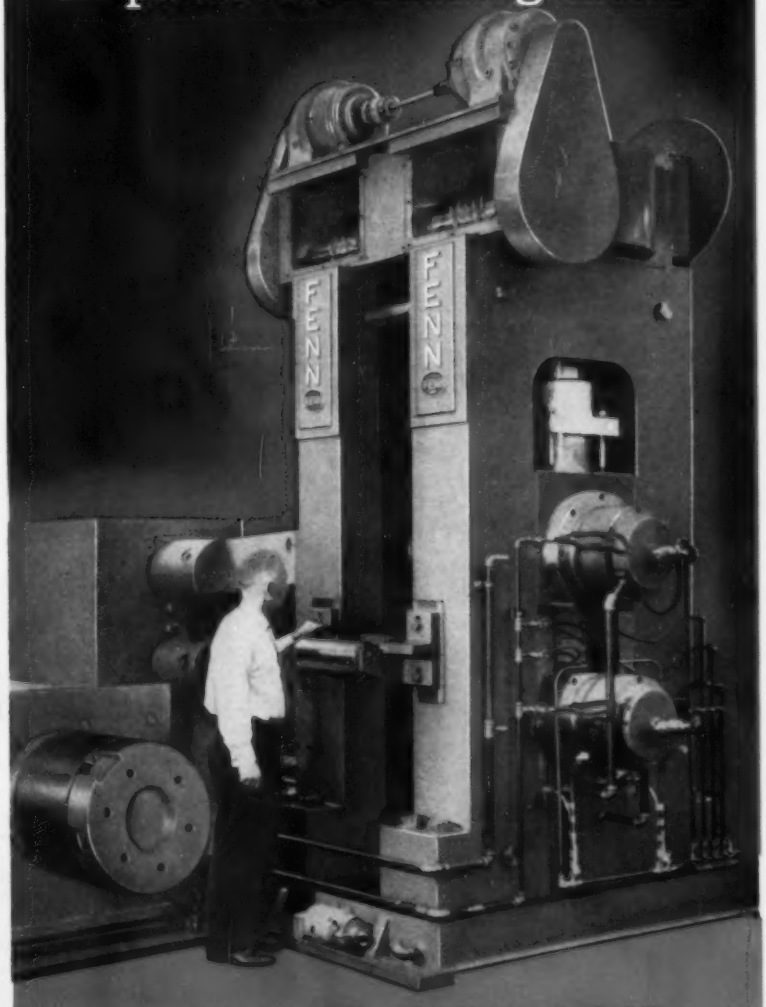
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PROGRAM

con-Boron, Erwin Parthe, J. T. Norton, M.I.T.

Use of Controlled Solidification in Equilibrium Diagram Studies, W. A. Tiller, Westinghouse.

Solid-Liquid Phase Equilibrium in the Bi2Te3-Bi2Se3 Pseudo-Binary System, J. P. McHugh and W. A. Tiller, Westinghouse.

CsCl-Type Equiatomic Phases in Binary Alloys of Transition Elements, A. E. Dwight, Argonne National Lab.

Effect of Chromium on the Stability of Cementite, George Sandoz, B. F. Brown, U. S. Naval Research Lab.

Session held in Embassy Room:

DEFORMATION—I

Anomalous Effect of Hydrogen on the Mechanical Properties of Ti-8 Mn and Ti-4 Al-4 Mn Alloys, A. H. Fleitman, Crane Co.

Effect of Complexing on Mechanical Properties of Ti-6 Al-3 Mo Alloy, F. A. Crossley, Armour Research Foundation, W. F. Carew, Joliet Metallurgical Labs, Inc.

A Decision Technique for Evaluating the Effect of Melting and Casting Environments on Stress-Rupture Properties, J. T. Brown, Westinghouse.

Short-Time Creep of Some Graphites at 3000-5300° F., H. E. Martens, L. D. Jaffee, D. D. Button, Cal. Tech.

Ductility of Polycrystalline Ceramics, C. E. May, H. H. Grimes and R. A. Lad, National Advisory Committee for Aeronautics.

Effect of Surface Condition on the Initiation of Plastic Flow in Magnesium Oxide, R. J. Stokes, T. L. Johnston and C. H. Li, Minneapolis-Honeywell.

Three-Dimensional Ductility and Crack Propagation of Preferentially Oriented Beryllium Sheet, F. M. Yans and A. R. Kaufmann, Nuclear Metals, Inc.

Creep of a Dispersion-Hardened Aluminum Alloy, G. S. Ansell and J. Weertman, U. S. Naval Research Lab.

Tues., Oct. 28—9:00 a.m.

Session held in Lorenzo Carter Room:

SYMPOSIUM ON EFFECTS OF SMALL DIMENSIONS

Properties of Whiskers, N. Cabrera, Univ. of Virginia.

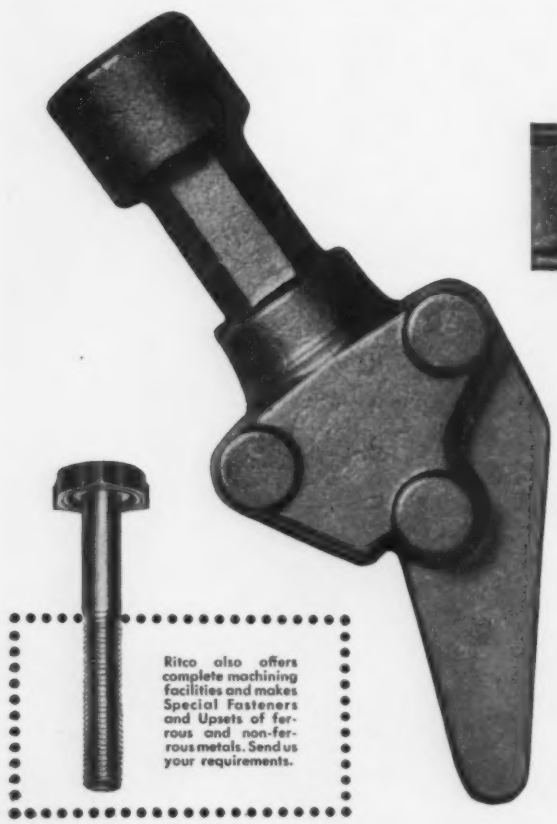
Mechanical Properties of Thin Films, J. W. Beams, Univ. of Virginia.

Magnetic Properties of Whiskers, Thin Films and Small Particles, C. P. Bean, G. E. Co.

Session held in Embassy Room:

SYMPOSIUM ON PHYSICAL CHEMISTRY OF HALIDE SYSTEMS

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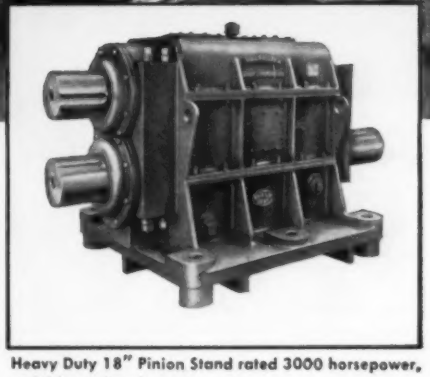
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PROGRAM

Deposition of Metals in Thermal Dissociation Processes, G. H. Kesler, Battelle Memorial Institute.

Use of Heat and Mass Transfer Model Studies in the Evaluation of the Rates of Deposition of Metals in Complex Systems, G. H. Kesler, J. H. Oxley, Battelle Memorial Institute, C. E. Dryden, Ohio State Univ.

Iodide Columbium, R. F. Rolsten, E. I. du Pont de Nemours and Co., Inc.

Session held in Oak Room:

SYMPOSIUM ON STEELMAKING IN THE SOVIET UNION—I

Raw Materials, J. B. Austin, U. S. Steel Corp.

Blast Furnaces and Coking, J. H. Strassburger, National Steel Corp.

Openhearths, M. F. Yarotsky, U. S. Steel Corp.

Electric Furnaces, K. C. McCutcheon, Consultant, Ashland, Ky.

Session held in Ballroom:

TITANIUM METAL SYMPOSIUM—I

Price, Quality and New Process Prospects for Titanium Sponge, Ingot and Billet: Panel—Graham Brown, Mallory - Sharon Metals Corp.; D. H. Baker, Jr., U. S. Bureau of Mines; G. A. Moudry, Harvey Aluminum Co.; W. E. Lusby, Jr., du Pont, Summary Address—H. H. Kellogg, Columbia U.

Price Trends and Market Analysis of Titanium Products, R. L. Vroome, Electro Metallurgical Co.

Current and New Uses of Titanium in Missiles, Aircraft and Aircraft Power Plants: Panel—W. H. Sharp, Pratt and Whitney Aircraft Div.; A. Hurlich, Convair Astronautics; L. J. Hull, Ryan Aeronautical Co.

Tues., Oct. 28—2:00 p.m.

Session held in Ballroom:

TITANIUM METAL SYMPOSIUM—II

Status and Use of Titanium Abroad.

Review of Dept. of Defense Sheet Rolling Program: N. E. Promisel, Navy Bureau of Aeronautics (to Summarize Phases I and II), George Sachs, University of Syracuse (to Summarize Phase III).

Panel: C. W. Alesch, Convair: T. H. Gray, Boeing Airplane Co.; W. W. Wood, Chance Vought Aircraft, Inc.

New Alloys:

Moderator: R. I. Jaffee, Battelle Memorial Institute.

Panel: Harold Margolin, New York U.; S. A. Herres, Titanium Metals Corp. of America; W. L. Finlay, Crucible Steel Co. of America; T. E. Perry, Republic Steel Corp.; L. S. Busch, Mallory-Sharon Metals Corp.

Session held in Embassy Room:

SYMPOSIUM ON NEW APPLICATIONS OF THE PHASE RULES IN EXTRACTIVE METALLURGY

Graphical Representation of Heterogeneous Ternary Equilibria, J. H. Downing, Electro Metallurgical Co.

Heterogeneous Equilibria in Multicomponent Systems, L. S. Darken, U. S. Steel Corp.

Recent Studies of Geological Materials at High Pressures and Temperatures, J. F. Schairer, Carnegie Institute of Washington.

Representation and Interpretation of Phase Equilibria in Oxide Systems Involving Changes in Oxidation States, A. Muan, Pennsylvania State U.

Derivation of the Approximate Ternary Phase Diagram Silicon-Oxygen-Carbon, W. A. Krivsky, Electro Metallurgical Co.

Quaternary Systems, R. Schuhmann, Jr., Purdue U.

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PROGRAM

Session held in Lorenzo Carter Room:

SYMPOSIUM ON STEELMAKING IN THE SOVIET UNION —II

Alloy Steels, Gunther Mohling, Allegheny Ludlum Steel Corp.

Rolling Mills, F. S. Eckhardt, Bethlehem Steel Corp.

Vacuum Techniques in Metallurgy, A. M. Aksoy, Crucible Steel Co.

Observations on the Direction of Steelmaking Research and Development, J. F. Elliott, M.I.T.

Session held in Oak Room:

DEFORMATION—II

Slip in Aluminum-Silver Single Crystals, A. Kelly, A. Lassila and S. Sato, Northwestern U.

Experimental Observations of Some Dislocation Sources, J. J. Gilman, G. E. Co.

Photographic Evidence of Frank-Read Dislocation Sources in Zinc, V. Damiano and M. Herman, Franklin Institute.

Dislocation Behavior During Creep of Silver—The Initial Creep Period, M. S. Abrahams and E. S. Machlin, Columbia U.

Flow Stress of Iron and Its Dependence on Impurities, G. C. Schoeck, Westinghouse, and A. Seeger, Max Plank Institut fur Metallforschung, Stuttgart, Germany.

Effect of Changes in Slip Direction on the Creep of Magnesium Crystals, Hans Conrad, Westinghouse.

Activation Energies for Creep of Single Aluminum Crystals Favorably Oriented for Cubic Slip, Y. A. Rocher, L. A. Shepard and J. E. Dorn, Univ. of California.

Factors Affecting Ductility and Strength of NaCl Single Crystals Tested in Flexure, C. A. Stearns, A. E. Pack and R. A. Lad, NACA.

Wed., Oct. 29—9:00 a.m.

Session held in the Ballroom:

SYMPOSIUM ON OXIDATION PROTECTION AND FABRICATION

Nucleation and Growth of Chromium on Molybdenum in Liquid Metal Solutions, J. Wulff and S. T. Wlodek, M.I.T.

Metallic Coatings for Molybdenum, G. D. Oxx, G. E. Co.

Arc Melting and Fabrication of Tungsten, S. J. Noesen, J. R. Hughes, C. L. Kolbe and R. C. Leech, G. E. Co.

Orientation of Large Grains in Annealed Tungsten Wire, A. J. Opensky, Syvania Electric Products, Inc.

Arc Melting and Fabrication of Annealing of Tantalum to Produce Foil, S. J. Noesen, M. A. Cocca and R. C. Leech, G. E. Co.



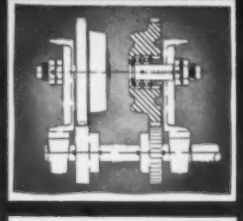
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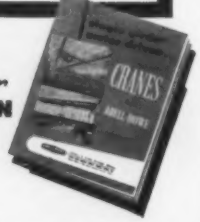


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Session held in Oak Room:

HIGH-PURITY METALS

Growth of Molybdenum, Tungsten and Columbium Crystals by Floating Zone Melting in Vacuum, E. Buehler, Bell Telephone Labs., Inc.

Determination of the Limiting Segregation of Gallium in Zone-Refined Germanium, L. W. Davies, Commonwealth of Australia.

Zone Melting of Magnesium, A. S. Yue, Dow Chemical Co.

Session held in Embassy Room:

PRECIPITATION AND SEGREGATION

Metallographic Study of Precipitation of Silicon From a Supersaturated Al(Si) Solid Solution, H. S. Rosenbaum, G. E. Co.

Acoustical Study of G. P. Zone Formation After Reversion in Al-20% Ag, Herbert Herman and M. E. Fine, Northwestern U.

Critical Particle Size for Precipitation Hardening, J. D. Livingston, G. E. Co.

Correlation Between Sub-Boundaries and Impurities in Super-Purity Aluminum, D. Altenpohl, Aluminum Foils, Inc.

Session held in Lorenzo Carter Room:

SYMPOSIUM ON CERAMIC BASE ELEMENTS

Fabrication of Ceramic Fuel Elements by Swaging, D. R. Stenquist, R. J. Anicetti, G. E. Co.

Pressure Bonding of Zircaloy-Clad Flat-Rate Uranium Dioxide Fuel Elements, S. J. Paprocki, E. S. Hodge, D. C. Carmichael, Battelle Institute.

Fabrication of Aluminum-Plate-Type Elements Containing Uranium Dioxide as the Fuel, S. I. Megeff and J. L. Sambrow, Sylvania-Corning Nuclear Corp.

Stainless Steel-Uranium Dioxide Fuel Components for Army Package Power Reactor, J. E. Cunningham and R. J. Beaver, Oak Ridge National Lab.

Preparation of Zirconium-Base Dispersion Fuels, A. P. Beard and R. N. Honeyman, G. E. Co.

Fabrication and Properties of Uranium-Zirconium Hydride Fuel Elements for Triga Reactors, W. P. Wallace, M. T. Simnad, B. Turovlin, General Atomic Div., General Dynamic Corp.

Wed., Oct. 29—2:00 p.m.

Session held in Lorenzo Carter Room:

SYMPOSIUM ON METAL BASE FUELS AND JACKET COMPONENTS

Silicon-Modified Uranium-Aluminum Alloys for Foreign Reactor Applications, W. C. Thuber and R. J. Beaver, Oak Ridge National Lab.

Fabrication of Iron-Aluminum-Chromium Alloy Fuel Plates, F. G. Tate, J. Neri, Blake King, Martin Co.

Fabrication of Zircaloy-2 Clad Uranium 12% Molybdenum Fuel Rods, J. G. Goodwin, R. W. Tombaugh, E. L. Richards, F. R. Lorenz, Westinghouse.

Manufacture of EBR-I, Mark III Fuel and Blanket Elements, R. A. Noland, N. J. Carson, C. C. Stone, R. E. Macherey, F. D. McCuaig, Argonne National Lab.

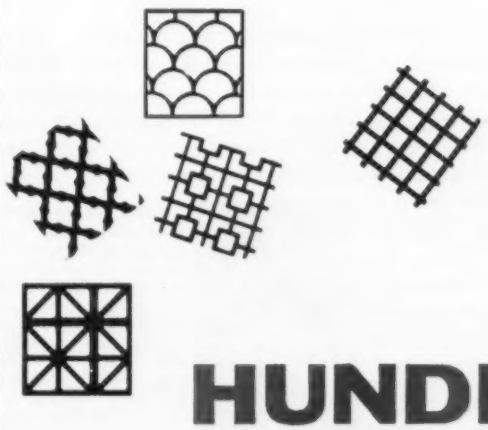
Bonding of Aluminum With Elemental Silicon, R. A. Noland, D. E. Walker, Argonne.

Alternate Bonding Techniques for Fuel Element Components, F. L. Orrell and H. R. Hoge, Westinghouse.

Fuel Element Closures, J. E. Minor, S. H. Bush, G. E. Co.

Session held in the Ballroom:

SYMPOSIUM ON METALLURGY OF COLUMBIUM AND ITS ALLOYS



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PROGRAM

Some Physical and Mechanical Properties of Columbium and Its Alloys, R. T. Begley and L. L. France, Westinghouse.

Some Effects of Alloying on the Strength Properties of Columbium at Elevated Temperatures, G. D. Gemmel, du Pont.

Properties of Some Columbium Alloys, R. G. Frank, G. E. Co.

Properties of the Ternary Alloy Cb-10% Ti-10% Mo, A. H. Grobe, Thompson Products, Inc., H. B. Hix, du Pont.

Oxidation Behavior of a Columbium-Zirconium Alloy, G. M. Gordon, R. Speiser and J. W. Spretnak, Ohio State U.

Hot Hardness Measurements of Some Columbium-Base Alloys, A. L. Eiss, L. Sama and H. P. Kling, Sylvania-Corning Nuclear Corp.

Mechanical Properties and Oxidation Resistance of Columbium-Base Alloys, F. R. Schwartzberg, D. N. Williams, R. I. Jaffee, Battelle Institute.

Session held in Oak Room:

SYMPOSIUM ON ELECTRICAL AND MAGNETIC METALS

Magnetic Methods in Metallurgy, Anthony Arrott, Ford Motor Co.

Physical Metallurgy of Megnetic Materials, J. J. Becker, G. E. Co.

Application of Magnetic Materials, M. F. Littman, Armco Steel Corp.

The Heusler Alloys, F. A. Hames, Queens Univ., Kingston, Ontario.

Session held in Embassy Room:

TRANSFORMATION

Correlation of Transformation Behavior With Mechanical Properties of Several Titanium-Base Alloys, A. J. Griest, J. R. Doig, P. D. Frost, Battelle Institute.

Lattice Stability of Metals. Pt. I —Titanium and Zirconium, Larry Kaufman, Manufacturing Labs., Inc.

Effects of Composition on Transformations in Titanium-Chromium

Alloys, H. I. Aaronson, Ford Motor Co.; W. B. Triplett, Carnegie Tech, G. M. Andes, du Pont.

Effects of Aluminum on Morphology and Kinetics of Alpha Formation in a Ti-10% Mo. Alloy, H. I. Aaronson, Ford Motor Co.; W. B. Triplett, Carnegie Tech, G. M. Andes, du Pont.

Relation Between Beta Grain Size and Ductility of High-Strength Alpha-Beta Titanium Alloys, A. J. Griest, A. P. Young, P. D. Frost, Battelle Institute.

The Alpha-Beta Transformation in Zircaloy-2, Josef Intrater, Materials Research Corp.

Orientation of Single Martensite Plates in Austenite, H. M. Otte, Rias, Inc.

Order-Disorder Transformations in Iron-Aluminium Alloys, H. J. McQueen and G. C. Kuczynski, Univ. of Notre Dame.

Measurement of Grain Continuity in Two-Phase Alloys, J. Gurland, Boston U.

Thurs., Oct. 30—9:30 a.m.

Session held in the Ballroom:

SYMPOSIUM ON MECHANICAL PROPERTIES AND EFFECT OF INTERSTITIALS

Dislocations in Molybdenum, R. D. Forrest and D. W. Bainbridge, Colorado School of Mines.

Effect of Variations in Carbon and Oxygen Contents in the Properties of Wrought Molybdenum-Titanium Alloys, M. Semchyshen, R. Q. Barr, American Metal Climax, Inc.

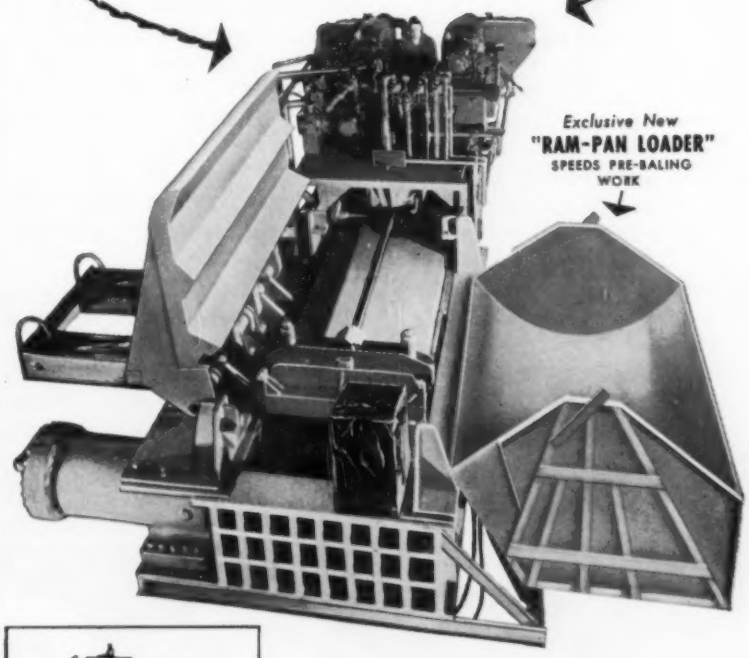
Strengthening by Carbide Dispersion in Molybdenum Alloys, W. H. Change, G. E. Co.

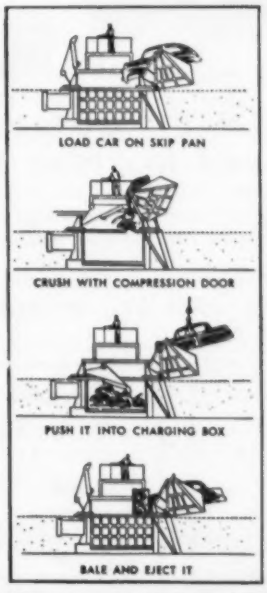
Deoxidation and Denitrification Studies of Chromium and the Effect on Low-Temperature Properties, H. L. Levingston, N. J. Grant, M.I.T.

Influence of Interstitial Content and Processing Variables on the Mechanical Properties of Columbium Metal, A. L. Mincher and W. F. Sheely, Electro Metallurgical Co.

High-Temperature Tensile Properties of Molybdenum and Tungsten, R. W. Hall, P. F. Sikora,

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PROGRAM

NACA, Lewis Flight Propulsion Labs.

Session held in Embassy Room:

DIFFUSION

Layer Growth During Interdiffusion in the Aluminum-Nickel Alloy System, L. S. Castleman and L. L. Seigle, Sylvania Electric Products Inc.

Theoretical Calculation of the Relaxation of Atoms Surrounding a Vacancy in Cubic Metals From Morse-Type Potentials, L. A. Girifalco and V. G. Weizer, NACA.

Effect of Static Strains on Solid-State Diffusion — a Theoretical Treatment, L. A. Girifalco and H. H. Grimes, NACA.

Effect of Plastic Flow on Self-Diffusion in Silver, A. F. Forestieri and L. A. Girifalco, NACA.

Self-Diffusion in Tin Single Crystals, J. D. Meakin, Eric Klokholm, Franklin Institute.

Short Circuit Diffusion, G. T. Murray, Materials Research Corp., E. S. Machlin, Columbia U.

Formation of Surface Pits by the Condensation of Vacancies, P. E. Doherty and R. S. Davis, Harvard U.

Stress-Induced Ordering Internal Friction of Iron-Aluminum Alloys, J. C. Shyne, Ford Motor Co., M. J. Sinnott, Univ. of Michigan.

Interstitial Stress Relaxation in Ternary Alloy Systems, D. Gupta, Univ. of Illinois, Sheldon Weinig, Materials Research Corp.

Session held in the English Room:

DEFORMATION AND FRACTURE

Cause of Cleavage Fractures in Ductile Materials, J. Washburn, A. E. Gorum, E. R. Parker, Univ. of California.

Deformation Resulting From Grain Boundary Sliding, Hans Brunner, N. J. Grant, M.I.T.

Measurements of Deformation Resulting From Grain-Boundary Sliding in Aluminum and Aluminum-Magnesium Alloys from 410 to 940° F., Hans Brunner, N. J. Grant, M.I.T.

Preliminary Evaluation of the Silver Chloride-Alumina System as a Means of Studying Fine Particle Strengthening of Solids, T. L. Johnston, R. J. Stokes, C. H. Li, Minneapolis-Honeywell Co.

Effect of Liquid Metal Environments on the Fracture Strength of Solid Copper, D. A. Kraai, D. V. Ragone, E. E. Hucke, Univ. of Michigan.

Temperature Dependence of the Tensile Properties of Face-Centered Cubic Metals, R. P. Carreker, Jr., G. E. Co.

Initiation of Tensile Fracture in Ductile Metals, H. C. Rogers, G. E. Co.

Stress Analysis of the Bausch-Type Shear Test, W. L. Phillips, Jr., Dana Young, W. D. Robertson, Yale Univ.



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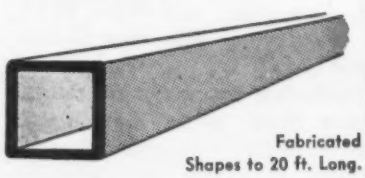
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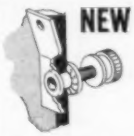
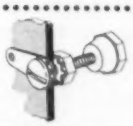
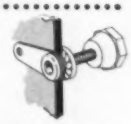
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PROGRAM

Session held in the Lorenzo Carter Room:

SYMPOSIUM ON POWDER METALLURGY

High-Purity Tantalum, R. F. Rolsten, du Pont.

Oxidation Resistance and Fabricability of Molybdenum-Nickel Dispersion Alloys, E. S. Bartlett, D. N. Williams, R. I. Jaffee, Battelle Institute.

Effect of Sintering Treatment on Electropotential and Strength of Carbonyl Iron, Bennett Bovarnick, Watertown Arsenal.

Some Properties and Metallography of Steel-Bonded Titanium Carbide, Martin Epner and Eric Gregory, Sintercast Corp. of America.

Highlights of the Third Plansee Seminar in Reutte Tyrol, Werner Leszynski, Schwarzkopf Development Corp.

Thurs., Oct. 30—2:00 p.m.

Session held in the Lorenzo Carter Room:

SYMPOSIUM ON LIQUID PHASE SINTERING

SOCIETY FOR NONDESTRUCTIVE TESTING

All sessions held in the Manger Hotel.

Mon., Oct. 27—9:00 a.m.

Session held in the Mather Room:

EDUCATIONAL CLINIC

Chairman: D. W. Ballard, National Educational Committee, SNT.

Welcome: C. H. Hastings, President, SNT; Fred Meunier, Chairman, Cleveland Section, SNT.

Orientation, Including Scope of Present Nondestructive Testing Field, by D. W. Ballard.

Source of Defects Located by Nondestructive Testing, by Carl E.

Betz, Magnaflux Corp., Chicago, Ill.

Radiography, by W. D. Kiehle, Eastman Kodak, Co., Rochester, N. Y.

Isotope Radiography, by D. E. Elliott, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.

Nucleonic Gaging Methods, by J. E. Reider, Industrial Nucleonics Corp., Columbus, O.

Fluoroscopy, by Walter Hampe, Westinghouse Electric Corp., Chicago, Ill.

Penetrant Inspection, by R. C. Eichin, Magnaflux Corp., Chicago, Ill.

Mon., Oct. 27—1:45 p.m.

Session held in the Mather Room:

EDUCATIONAL CLINIC

Chairman: Charles Tucker, Aluminum Co. of America, Cleveland, O.

Eddy Current Test Methods, by R. Hochschild, Metrol, Inc., Pasadena, Calif.

Magnetic Particle Inspection, by W. E. Thomas, Magnaflux Corp., Chicago, Ill.

Ultrasonic Inspection: Reflection and Contact Techniques, by J. C. Smack, Curtiss - Wright Corp., Princeton, N. J.

Ultrasonic Inspection: Immersed Techniques, by W. C. Hitt, Douglas Aircraft Corp., Santa Monica, Calif.

Ultrasonic Inspection: Resonant Techniques, by K. P. Hayes, Branson Instruments Inc., Stamford, Conn.

Educational Problems and Activities in Nondestructive Testing, by R. C. McMaster, Welding Dept., Ohio State University, Columbus, O.

Monitors: J. H. Clemons, Ferro-Spec Labs., Cleveland, O., J. C. O'Neal, Sandia Corp., Albuquerque, N. Mex.

TECHNICAL SESSIONS

Mon., Oct. 27—9:30 a.m.

Session held in the Grand Ballroom:

OPENING SESSION

Chairman: R. E. Reynolds, Eastman Kodak Co., Los Angeles,

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INDIANA: "Rustripper is the best barrel compound we ever used for this job." (Removing tough heat treat scale from steel screws.) "Total cleaning and zinc plating time has been cut in half."

NEW JERSEY: "Only two cleaning rejects in first 15,000 parts plated." (After Rustripper was added to reverse current cleaner in automatic plater to eliminate smut from tubular steel furniture.)

NEW YORK: "Had trouble with light rust on business machine parts before cadmium plating; also with smut left after electrocleaning. Rustripper cured both troubles."

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PROGRAM

Calif.; Co-Chairman: M. J. Curtis, Naval Ordnance Test Station, China Lake, Calif.

Welcome to Cleveland, by F. A. Meunier, chairman, Cleveland Section, SNT.

Opening Address, by Carleton H. Hastings, president SNT, Avco Mfg. Corp., Lawrence, Mass.

How Mangement Views Nondestructive Testing, by H. Christen, Lockheed Aircraft Corp., Burbank, Calif.

Electrode Potential Testing, by P. D. Edwards, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.

New Low-Energy Photon Sources for Industrial Utilization, by F. L. Green and W. D. Cheek, General Motors Corp., Detroit, Mich.

Techniques for Improving Reliability of Electromagnetic Tests of Tubing, by R. Hochschild, Metrol, Inc., Pasadena, Calif.

Mon., Oct. 27—2:00 p.m.

Session held in the Grand Ballroom:

HONEYCOMB AND SANDWICH MATERIAL

Chairman: W. R. Plant, Knolls Atomic Power Laboratory, Schenectady, N. Y.; Co-Chairman: M. R. Jackson, Convair, Ft. Worth, Tex.

Qualitative Analysis of Brazed Sandwich, by F. J. Filippi, Solar Aircraft Co., San Diego, Calif.

Evaluation of Bond Quality in Honeycomb Panels Using Ultrasonic Surface Wave Techniques, by E. T. Hughes, Metallurgical Applications Section, and E. Burstein, Air Arm Div., Westinghouse Electric Corp., East Pittsburgh, Pa.

Immersed Ultrasonic Inspection of Metal Plate, by R. W. McClung, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Nondestructive Testing of Nonmetallic Materials, by C. E. Betz, Magnaflux Corp., Chicago, Ill.

Eddy Current Measurements of Metal Thickness and Cladding Thickness, by R. A. Nance and J. W. Allen, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Nondestructive Testing of Bonded and Brazed Aircraft Structures, by T. G. Bogle, Temco Aircraft Corp., Dallas, Tex.

Tues., Oct. 28—9:00 a.m.

Session held in the Grand Ballroom:

WELD EVALUATION

Chairman: J. F. Torbet, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.; Co-Chairman: H. Hovland, Industrial X-Ray Engineers, Seattle, Wash.

Ultrasonic Weld Inspection, by J. E. Bobbin, Sperry Products, Inc., Danbury, Conn.

Investigation of Radio-Isotopes for the Inspection of Ship Welds, by D. Polansky, E. L. Criscuolo and D. P. Case, Naval Ordnance Lab., White Oak, Md.

Radiographic Inspection of Welded Turbine Wheels for Jet Starters, by A. R. Potenski, Bendix Aviation Corp., Utica, N. Y.

Nondestructive Testing Assists the Small Manufacturer, by A. G. Barkow, Marquette University, Milwaukee, Wis., and S. J. Boehringer, Boehringer Engineering Products, Inc.

Weld Evaluation by Magnetic Particle and Liquid Penetrant Inspection, by Paul Maertz, A. O. Smith Corp., Milwaukee, Wis.

Radiographic Inspection of Welded Highway Bridges, by J. L. Beaton and Paul G. Jonas, California Div. of Highways, Sacramento, Calif.

Tues., Oct. 28—9:00 a.m.

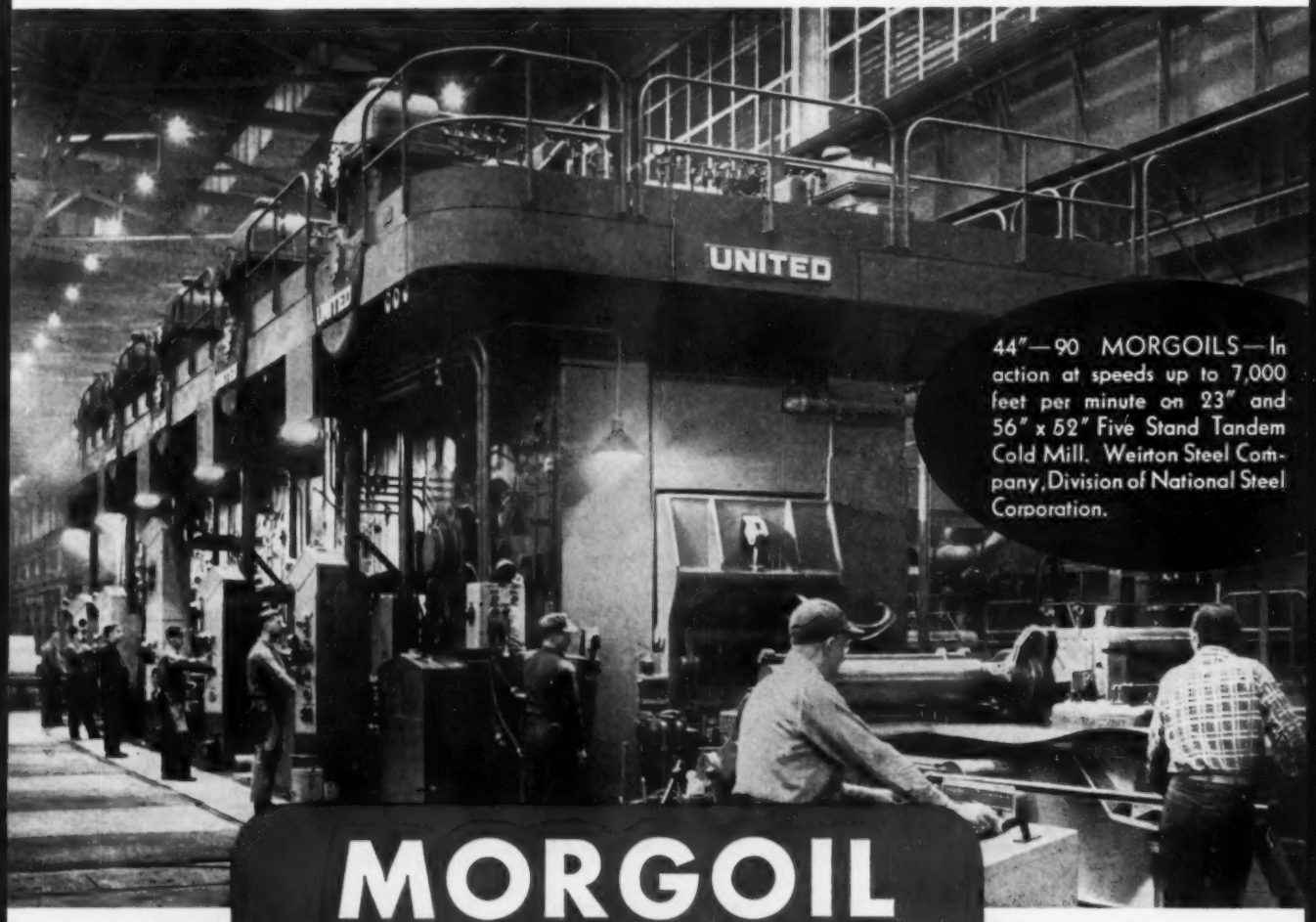
Session held in the Grand Ballroom:

RADIOGRAPHIC

Chairman: D. Polansky, Naval Ordnance Lab., White Oaks, Md.; Co-Chairman: J. F. Vokoun, E. I. du Pont de Nemours & Co., Chicago, Ill.

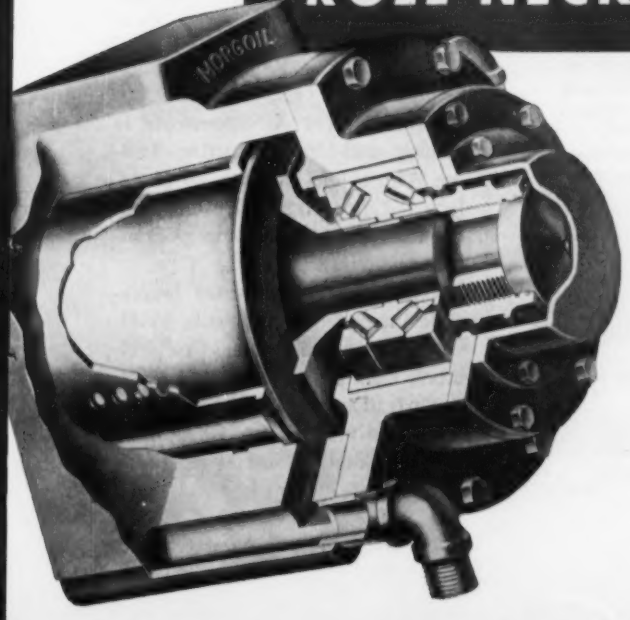
New Techniques for Nonphotographic Observation of X-Ray Images, by H. E. Haynes, Radio

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American METAL TURNINGS Crusher

That single machine turning of curled-up steel shown above can be mighty troublesome and costly to your operations.

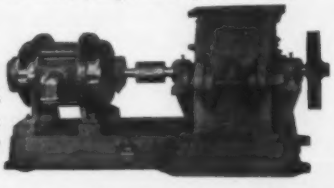
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PROGRAM

Corp. of America, Camden, N. J.

Fluoroscopic Image Intensifier Device, by E. L. Criscuolo and C. Dyer, Naval Ordnance Lab., White Oak, Md.

An Electronic High-Resolution X-Ray Imaging System, by J. W. Allen and R. W. McClung, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Investigation of Ionographic Techniques, by R. A. Youshaw and J. A. Holloway, Naval Ordnance Lab., White Oaks, Md.

Using a Crystal to Continuously Display High - Energy X - Ray Images, by J. S. Pruitt, Radiation Physics Lab., National Bureau of Standards, Washington, D. C.

Experiments on the Comparison of the Radiographic Qualities of the 1 Mev. Resotron and the 1 Mev. Van de Graaff X-Ray Units, by D. E. Elliott, Los Alamos Scientific Laboratory, Los Alamos, N. Mex., and C. M. Knowles, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Wed., Oct. 29—9:00 a.m.

Session held in the Grand Ballroom:

MEASUREMENT AND EVALUATION

Chairman: R. W. Larson, Milwaukee, Wis.; Co-Chairman: S Goldspiel, New York Naval Shipyards, Brooklyn, N. Y.

Industrial Application of Radio-Isotopes, by S. Regas, Radiation Counter Lab., Inc., Skokie, Ill.

Some Recent Advancements in Gaging and Nondestructive Testing With Radio-Isotopes, by O. M. Bizzell, Isotope Development Branch, U. S. Atomic Energy Commission, Washington, D. C.

Use of Radiography for Inaccessible Internal Measurements, by H. Howard, Dalmo Victor Co., Belmont, Calif.

Early Detection of Fatigue in Aluminum Alloys by Ultrasonics, by K. Sittel, Franklin Institute, Philadelphia, Pa.

Fatigue Properties of Ultrasonically Tested Aluminum Alloy Plate and Forgings, by J. L. Waisman, Tatnall Measuring Systems, Inglewood, Calif., L. L. Soffa, Northrop Aircraft, Hawthorne, Calif., and P. W. Kloeris and C. S. Yen, Douglas Aircraft, Santa Monica, Calif.

Cermet Body Nondestructive Test Data Evaluated by Spin Tests of Blades and Bend Tests of Bars, by A. G. Holms and A. J. Repko, N.A.C.A., Lewis Flight Propulsion Laboratory, Cleveland, O.

Wed., Oct. 29—2:00 p.m.

Session held in the Grand Ballroom:

SNT HONOR SESSION

Chairman: C. H. Hastings.

Lester Honor Lecture, by Brig. Gen. John A. Barclay, U. S. Army Ordnance Missile Command, Redstone Arsenal, Ala.

ANNUAL BUSINESS MEETING

Your Society—Where Is It Going?, by W. E. Thomas, chairman of the Past-Presidents Committee, SNT.

Wed., Oct. 29—7:30 p.m.

Session held in the Grand Ballroom:

SNT BANQUET

Flight Safety and Reliability, by Major General J. D. Caldara, Norton Air Force Base, San Bernardino, Calif. (Address to be delivered by Col. George W. Kinney.)

Thurs., Oct. 30—9:00 a.m.

Session held in the Grand Ballroom:

TUBING AND PIPING

Chairmen: W. E. Havercroft, Dept. of Mines & Technical Surveys, Ottawa, Canada; B. J. Cunningham, Westinghouse Electric Corp., Cheswick, Pa.

Ultrasonic Testing of Small-Diameter, Tubular, Stainless Steel Fuel Elements, by G. E. Fulmer, Washington Research Center, W.

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PROGRAM

R. Grace & Co., Clarksville, Md.

Magnetic Particle Inspection of Steel Tubing and Pipe, by R. G. Strother, Magnaflux Corp., New York, N. Y.

Radiographic Evaluation of Stainless, Inconel and Titanium Tubing Under 4 In. Diameter, by J. A. Kramer, NTH Products, Inc., El Cajon, Calif.

Eddy - Current Inspection of Welded Aluminum Tubing, by D. E. Kunkle, Aluminum Co. of America, New Kensington, Pa.

Some Uses for a Precision Magnetic Field Meter, by R. A. Betz, Bettis Atomic Power Div., Westinghouse Electric Corp., Pittsburgh, Pa.

Radiographic Inspection of Thin-Wall Small-Diameter Tubing, by G. M. Tolson and A. Taboada, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Thurs., Oct. 30—2:00 p.m.

Session held in the Grand Ballroom:

STEEL AND HEAVY METALS

Chairman: M. D. Phillips, A.C.F. Industries, Albuquerque, N. Mex.; Co-Chairman: James L. Coburn, Convair, Ft. Worth, Tex.

Effect of Deformation and Magnetic Field on Ultrasonic Attenuation in 1013 Steel, by R. Truell, Div. of Applied Mathematics, Brown University, Providence, R. I.

Ultrasonic Testing Procedures, by J. D. Morgan, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

Atomic Energy Commission Isotope Licensing Requirements, by J. W. Hitch, Isotopes Branch, U. S. Atomic Energy Commission, Washington, D. C.

Correlation of Ultrasonic Indications and Physical Properties of High-Strength Steels, by C. F. Raatz, Jr., Boeing Airplane Co., Seattle, Wash.

Use of the Beam Deflector to Ultransonically Test Bronze Castings, by N. J. Socoloski, Propeller Div. Curtiss-Wright Corp.

Quality and Economic Improvements Resulting From Nondestructive Testing, by H. McFaul and Cleo Webb, Douglas Aircraft, El Segundo, Calif.

Friday, Oct. 31—9:00 a.m.

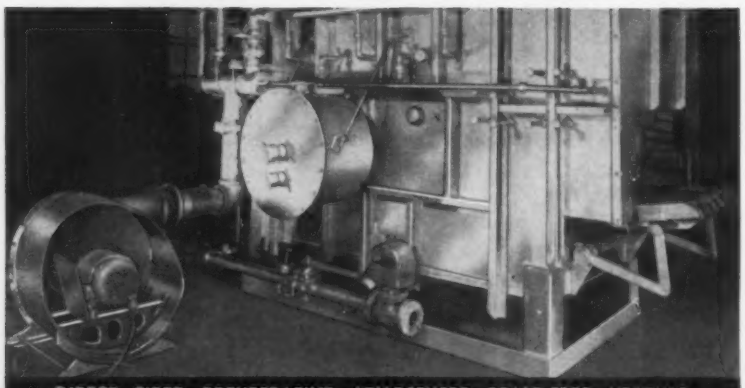
Session held in the Grand Ballroom:

STANDARDS FOR NONDESTRUCTIVE TESTING

Chairman: R. G. Strother, Magnaflux Corp., New York, N. Y.; Co-Chairman: E. L. Criscuolo, Naval Ordnance Lab., White Oak, Md.

The Percent Ring Method for Eddy Current Acceptance Standards, by Hamilton Migel, Magnaflux Corp., Chicago, Ill.

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DIRECT FIRED RECUPERATIVE ATMOSPHERE SCALE-FREE HEATING FURNACE BY THE LITHIUM CO. . . EQUIPPED WITH SPENCER BLOWER.

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FUEL: Oil or Gas

BLOWER
TYPE: Spencer Centrifugal Turbo-Compressor.

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SPENCER blowers . . . competitively priced . . . are consistently preferred by leading manufacturers of industrial furnaces of all types because of:

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Whatever *your* blower requirements, for incorporation on original equipment or for replacement, it will pay to check with SPENCER.

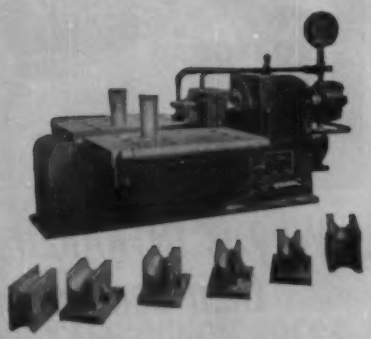


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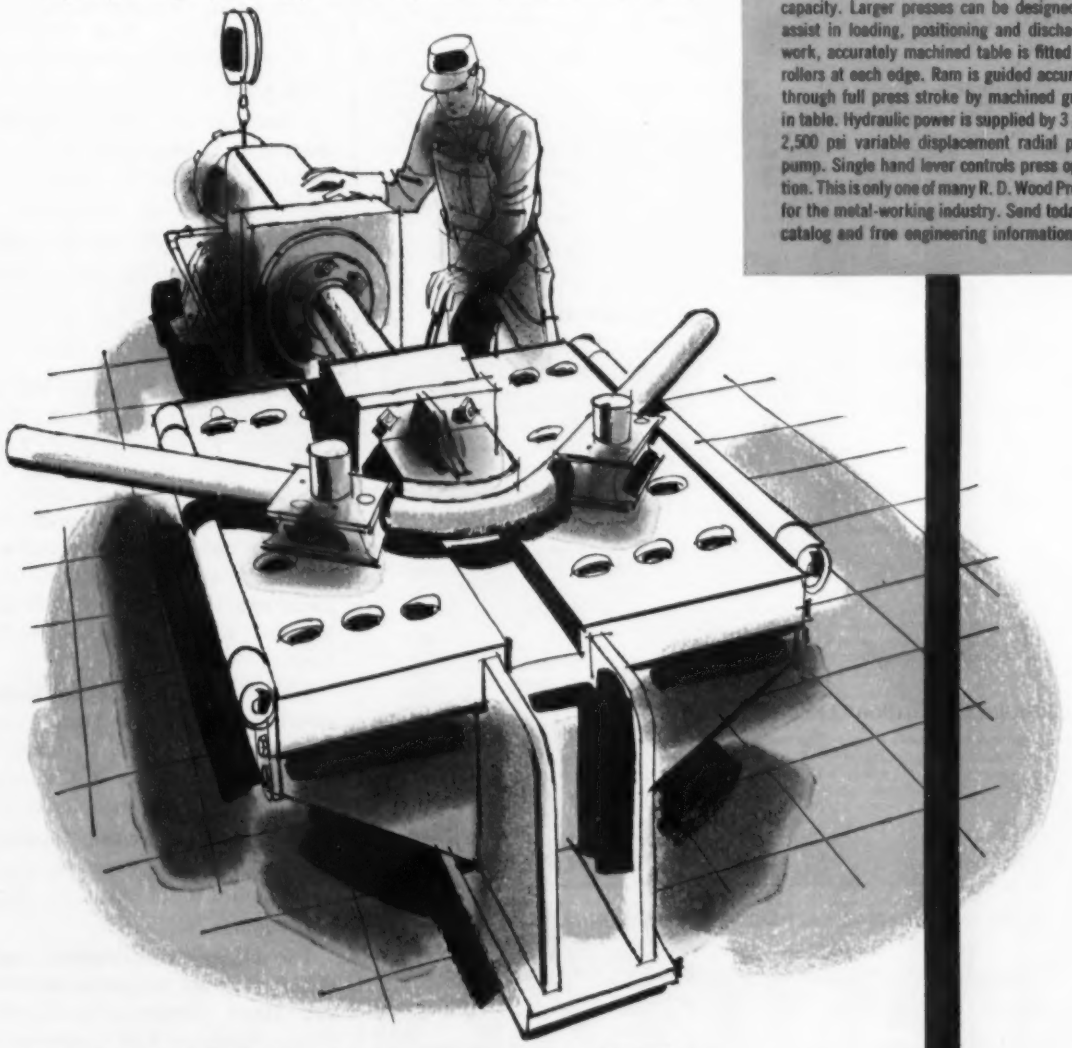
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How to save money on your next press: apply your specs to a basic R. D. Wood design

The result will be exactly *what you want*—just as surely as if you had it designed from scratch. And its cost will be much lower. Working with numerous basic models, R. D. Wood engineers can save considerable design time and expense, and still incorporate *your* specifications in the finished machine. You're sure of its quality, too. For every Wood Press is built by experts using selected materials. This brings additional saving from smooth, dependable performance; fast, economical production; trouble-free operation. *Before* you begin planning your next hydraulic press, consult Wood.



R. D. Wood 25 ton capacity, heavy-duty horizontal press for cold bending steel or copper pipes and tubes. Handles 1½, 2, 2½, 3, 3½, and 4" sizes with standard bending pins, forms and dies. Other sizes are available up to 200 tons capacity. Larger presses can be designed. To assist in loading, positioning and discharging work, accurately machined table is fitted with rollers at each edge. Ram is guided accurately through full press stroke by machined groove in table. Hydraulic power is supplied by 3 gpm, 2,500 psi variable displacement radial piston pump. Single hand lever controls press operation. This is only one of many R. D. Wood Presses for the metal-working industry. Send today for catalog and free engineering information.



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radiant heating news

to help manufacturers improve production operations

Why is INFRARED more productive than convection heating methods?

The excellent savings in time, money, space and manpower being obtained by users of radiant (infrared) ovens, compared with convection heating, can be traced to the basic differences between the two methods. It is largely the following fundamental differences which make infrared far superior in production heating operations:

CONVECTION HEATING	INFRARED HEATING
. . . IS INDIRECT	**. . . IS DIRECT**
Convection heating—regardless of fuel used—is indirect heating. Like the housewife who bakes in a gas range at home, industrial users of convection heating must first heat the *oven* before the product can be heated. So heating is delayed while product being processed absorbs heat from the heated atmosphere surrounding it.	Radiant energy heats any object *directly*, without heating the air in between the infrared source and the product being heated. (Like the sun's infrared rays melt snow on cold days.) The product does not have to take heat from surrounding air. This high radiation efficiency saves time and effort, because production heating begins immediately.
. . . IS SLOWER	**. . . IS INSTANTANEOUS**
Since energy is not transmitted directly to the product, in heating by convection, processing is necessarily much slower than by infrared process. Each product placed in convection oven must wait until surrounding air is adequately heated before it can absorb heat to desired temperature.	The moment your infrared heat is turned on, heat is transmitted to the product. No warm-up period is required. Desired temperature is obtained without delay, without wasted heat, thus enabling you to turn out more finished products in less time and at lower cost.
. . . WASTES VALUABLE HEAT	**. . . IS MORE EFFICIENT**
Escape of air must be limited to obtain efficient heating in a convection oven. On the other hand, most industrial applications also require an adequate *removal* of air to eliminate dangerous volatiles—particularly in paint baking. So we have a peculiar contradiction in principles: You must let air *escape*—even though it carries costly heat with it.	In an infrared oven you need only admit and exhaust enough air to reduce concentration of volatiles. Volume circulation of air is not required, so little heat is lost. Carefully controlled movement of air does not reduce product temperature, so higher heating efficiency is obtained. Maximum heat is squeezed out of every KW used in radiant heating.
. . . REQUIRES AIR TURBULENCE	**. . . MINIMUM AIR MOVEMENT**
Convection heating also requires the hot air to be constantly *moved* around the product, so heat can be absorbed. This often deposits dust and combustion particles on the product's surface. Special ventilating and filtering systems often must be used when an unmarred finish is demanded.	Since there are no products of combustion in an infrared oven, and minimum air movement, there is little chance for the finish to be marred by foreign matter. Rejects are therefore minimum. Maintenance costs go down. Product quality is increased. Profits are greater.

GET "RADIANT HEAT—APPLICATIONS UNLIMITED"

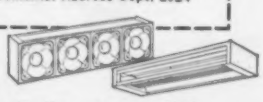
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Largest manufacturer of completely engineered infrared ovens and components in U. S. A.



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PROGRAM

Standards for Production Electromagnetic Testing of Steel Tubing, by F. A. Meunier, Republic Steel Corp., Cleveland, O.

Radiographic Standards for Aluminum and Magnesium Castings, by B. R. Swarts, Convair, San Diego, Calif.

Some Recent Applications of Eddy Current Equipment for Inspection in the Field, by V. Wiegand and W. Bodenstein, A.G.T. Div., General Electric Co., Cincinnati, O.

Ultrasonic Attenuation Characteristics of Various Steel Alloys, by C. J. Adams, Rocketdyne, Conoga Park, Calif.

Standards for Electromagnetic Testing of Tubing, by H. E. Babb, Metrol, Inc., Pasadena, Calif.

Friday, Oct. 31—2:00 p.m.

Session held in the Grand Ballroom:

ULTRASONIC

Chairman: R. A. Pulk, Detroit Arsenal, Center Line, Mich.; Co-Chairman: F. W. Armstrong, Babcock & Wilcox Co., Barberton, O.

Implications of Ultrasonic Attenuation to Nondestructive Testing, by J. K. White, R. W. McClung and J. W. Allen, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Effect of Fabrication on Inclusion-Type Defects and Their Ultrasonic Response, by G. J. Binczewski, Kaiser Aluminum & Chemical Corp., Spokane, Wash.

An Ultrasonic Testing Monitor, by F. C. Panian, Research Lab., Aluminum Co. of America, New Kensington, Pa.

Use of Special Ultrasonic Portable Devices for Inspection of Plate and Hand Forgings, by C. W. Cline, Research Lab., Aluminum Co. of America, New Kensington, Pa., and S. G. Von Stocker, Aluminum Co. of America, Pittsburgh, Pa.

Nondestructive Testing of Solid Propellant Rocket Motors, by M. E. Liebman, Polaris Engineering Div., Aerojet-General Corp., Sacramento, Calif.

Immersed Ultrasonic Testing With Contoured and Focussed Transducers, by R. C. McMaster, Automation Instruments, Inc., Columbus, O.

INDUSTRIAL HEATING EQUIPMENT ASSOCIATION, INC.

All sessions held at the Statler-Hilton.

Tues., Oct 28—9:00 a.m.

ENGINEERING & TECHNOLOGICAL DEVELOPMENT IN INDUSTRIAL HEATING PROCESSES

Engineering & Economic Elements in the Choice of Industrial Heating Equipment, by C. F. Olmstead, Lee Wilson Engineering Co., Cleveland, O.

Vacuum as a Furnace Atmosphere, by L. W. Johnson, General Electric Co.

Austempering, Martempering and Isothermal Heat Treating in Basic Industry, by A. F. Holden, A. F. Holden Co., Detroit, Mich.

Improvements in Induction Heating, by W. E. Benninghoff, Tocco Division, The Ohio Crankshaft Co., Cleveland, O.

AMERICAN SOCIETY FOR TESTING MATERIALS

Committee B-9 meeting on Powdered Metals.

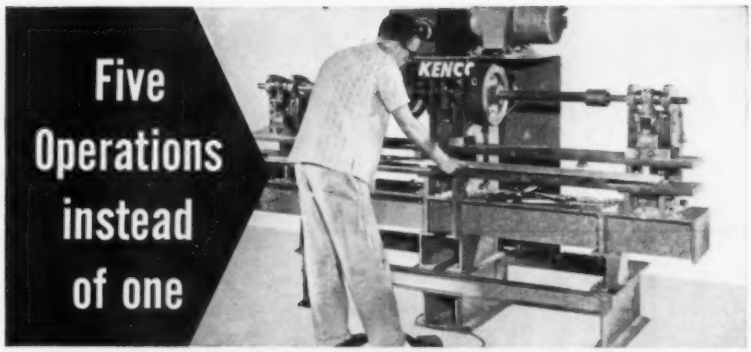
All sessions held in the Manger Hotel.

Tues., Oct. 28—9:00 a.m.

Nomenclature and Technical Data; Friction.

Tues., Oct. 28—2:00 p.m.

Base Metal Powder; Friction Materials; Machinable Heavy Metals.



with special KENCO ELECTRO-SAFE PUNCH PRESS

Eighty inches long—extruded aluminum strips are punched, dimpled and both ends slotted at the rate of 350 per hour on a special KENCO, ELECTRO-SAFE PUNCH PRESS. Die changes permit six different parts to be handled on this machine, one of which is 16 feet long.

The Press engineered and built by KENCO utilizes three Standard KENCO 5 ton presses arranged with a double drive on the Center Press with heavy connecting shafts which evenly distribute the torque loading. The ELECTRO-SAFE SYSTEM prevents accidental tripping because the motor is always "dead" except during a stroke. A dial controls "Single Stroke," "Continuous Stroke," or "Inching" operation.

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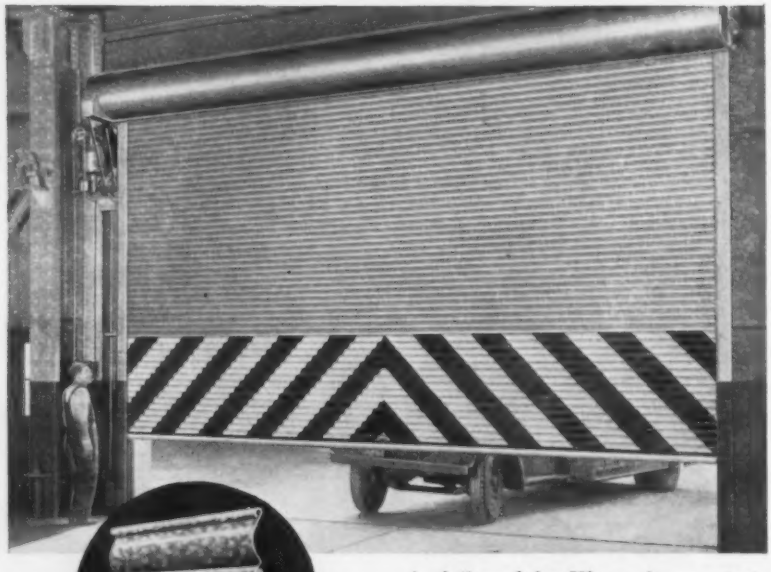
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Equally important is Kinnear's thorough, heavy, high grade galvanizing. It adds a full 1.25 ounces of *pure zinc* to every square foot of metal, (ASTM standards). This galvanizing is followed by Kinnear's own *test-proved, time-proved* Paint Bond treatment, which assures quick, thorough, *lasting* coverage and adhesion of paint applied after the doors are erected.

These Kinnear "life-extension" features give you *more years* of smooth, space-saving, time-saving door efficiency—*more years* of extra all-metal protection against fire, wind, weather, vandalism and intrusion. Kinnear Rolling Doors are built to fit openings of any size, with manual or motor operation to meet any need. Write for details.

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KINNEAR
ROLLING DOORS
Saving Ways in Doorways

PROGRAM

Wed., Oct. 29—9:00 a.m.
Bearings; Cemented Carbides.

Wed., Oct. 29—2:00 p.m.
Refractory Metal Powders; Structural Parts.

METAL POWDER INDUSTRIES FEDERATION

Session held in Hotel Cleveland, Cleveland Room.

Wed., Oct. 29—2.00 p.m.

ENGINEERING ASPECTS OF POWDER METALLURGY STRUCTURAL COMPONENTS

Moderator: George A. Roberts, President, MPIF.

Introductory Remarks, by Kempton H. Roll, executive secretary, MPIF.

Tolerances, by Robert Burgess, Burgess-Norton Manufacturing Co.

Properties, by George Stern, American Sinteel Corp.

Design, by Peter Schneider, International Business Machines Corp.

Summation, by George A. Roberts.

METAL TREATING INSTITUTE

Session held at Hotel Cleveland.

Thurs., Oct. 30—9:30 a.m.

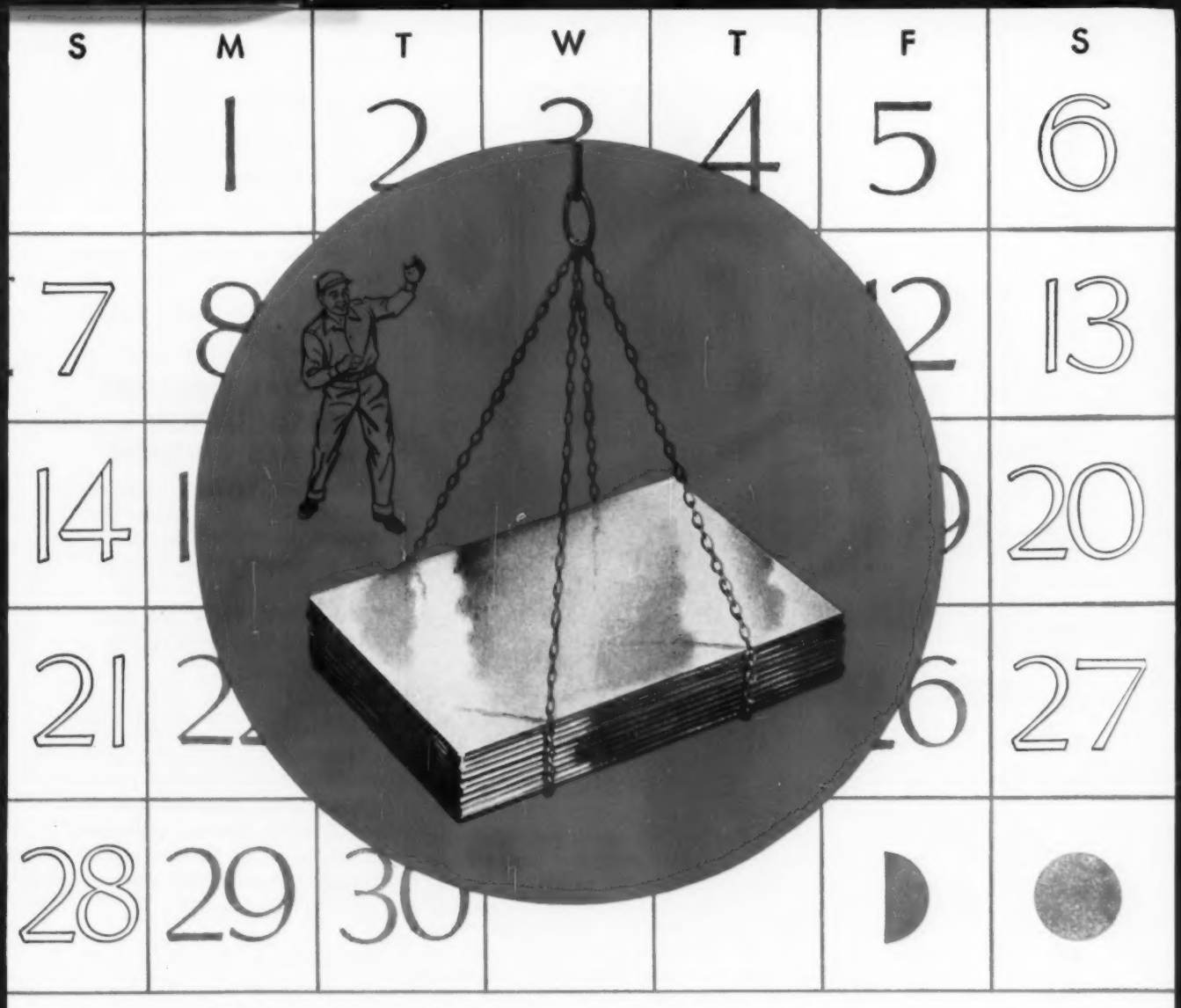
HEAT TREATING

Chairman: Michael Soviak, Commercial Steel Treating Co., Detroit, Mich.

Limiting Distortion of High-Strength Steels With Simple Tempering Fixtures, by Fred Heinzelman, Jr., Fred Heinzelman & Sons, New York, N. Y.

Heat Treatment in a Vacuum, by R. C. Gross, Kinetics Corp., Hingham, Mass.

Expected Variation in Harden-



Ingersoll Steel Deliveries

TIMED TO YOUR PRODUCTION

Here at Ingersoll Steel we knock ourselves out to give you on-time, as-promised delivery of a wide variety of special purpose steel sheets and plates. The minute your order is received it starts getting the V.I.P. treatment—and that's the way it goes all the way to your receiving department.

Being a specialty mill, we can and do adjust our production schedules to dovetail with your production needs. And with our advantageous central location at New Castle, Indiana, prompt deliveries are assured. Next time you need any of the products listed below, call Ingersoll Steel and you'll see what we mean.

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STAINLESS STEELS • HEAT RESISTING STEELS • INGACLAD STAINLESS-CLAD SHEETS • ALLOY STEELS • FORGING QUALITY ELECTRIC STEEL INGOTS • AUTOMOTIVE CLUTCH PLATE STEELS TEM-CROSS CROSS-ROLLED STEEL • CARBON ELECTRIC STEEL FOR TRACTOR CLUTCH DISCS • KNIFE STEELS • SAW STEELS HIGH SPEED HACK SAW STEELS • SOFT CENTER AND OTHER AGRICULTURAL STEELS • SPECIAL ANALYSIS STEELS

INGERSOLL STEEL
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®

Ingersoll STEEL DIVISION

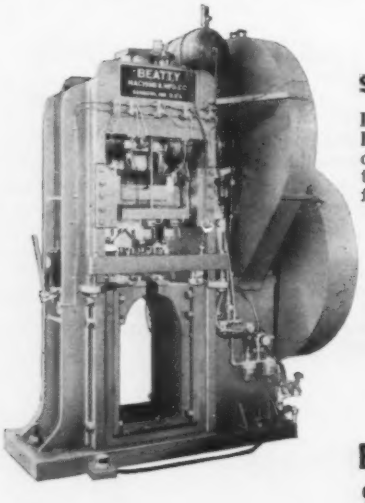
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New Castle, Indiana



BEATTY EQUIPMENT IN YOUR SHOP MAKES HIS JOB EASIER, TOO!

On the job, erecting the structural steel which you fabricate, the precision, speed and accuracy of Beatty Machines pays off big for your customers, too! That's because Beatty equipment is engineered for maximum accuracy and speed in heavy metal-working — punching, slotting, bending, flanging, forming. Beatty machines help you deliver the goods on time, speed fabrication by reducing set-up time and material handling. The new Beatty No. 7 Detail Flange Punch, for example, flange-punches I-beams in only two passes where ordinary equipment requires four passes. Look to Beatty for heavy metal-working equipment — a complete line of punches, presses, shears, bulldozers.



SPECIFICATIONS

BEATTY NO. 7 DETAIL FLANGE PUNCH — 100-ton cap., mechanically driven guillotine-type. Punches 1¼" hole through 1" mild steel and handles beams from 6" to 36".



Write For Full Details

BEATTY MACHINE & MFG. CO.
936 150th St., Hammond, Ind.

PROGRAM

ability of AISI 4142 Steel, by Charles F. Lewis, Cook Heat Treating Co. of Texas, Houston, Tex.

Mysterious Failures in Heat Treating and Their Solution, by Horace C. Knerr, Metlab Co., Philadelphia, Pa.

SPECIAL LIBRARIES ASSOCIATION— METALS DIVISION

Chairman: R. W. Gibson, Jr., assistant chief, Information Management, Battelle Memorial Institute, Columbus, Ohio.

Wed., Oct. 29—4:00 p.m.

Executive Committee Meeting at the Hotel Carter.

Thurs., Oct. 30—9:30 a.m.

Sessions at the Lewis Flight Propulsion Lab. of NACA:

Research on Materials for Aircraft Nuclear Reactors; Research on Materials for Powerplants for Aircraft; Movie on High-Temperature Materials Research.

Thurs., Oct. 30—1:30 p.m.

Sessions at the Lewis Flight Propulsion Lab:

Tour of the Laboratory facilities at NACA.

Friday, Oct. 31—9:30 a.m.

Session at the Public Auditorium:

Metals Meet the Competition, by Grant Clark, Reynolds Metals Co., A. B. McKee, Foil and Packaging Div., Aluminum Co. of America, F. A. Loebach, Kaiser Aluminum & Chemical Sales, Inc., and J. D. Briggs, Commercial Research and Industrial Development Div., Bethlehem Steel Co., Inc.

Friday, Oct. 31—1:30 p.m.

Republic Steel Corp.

Tour of Republic's New Research Laboratory.

SPECIAL SEMINAR ON RESIDUAL STRESSES

All sessions in Wade Park Manor.

Thurs., Oct. 30

I—Definition and Origin

Commentators: H. R. Neifert, Timken Roller Bearing Co.; J. A. Halgren, International Harvester Co.

II—Measurement of Residual Stresses

Commentators: E. S. Rowland, Timken Roller Bearing Co.; Ray L. Mattson, General Motors Corp., Technical Center; George A. Butz, Aluminum Co. of America.

Fri., Oct. 31

III—Influence of Residual Stress on Deformation, Static Strength and Dimensional Stability

Commentators: H. J. Noble, Pratt & Whitney Aircraft; E. S. Rowland, Timken Roller Bearing Co.

IV—Influence of Residual Stress on Fatigue Strength and Stress Corrosion Cracking

Commentators: Ray L. Mattson, General Motors Corp., Technical Center; Julius Heuschkel, Westinghouse Electric Corp.; Leo P. Tarasov, Norton Co.

V—Relation Between Residual Stresses and Brittle Fracture

Commentators: Julius Heuschkel, Westinghouse Research Laboratories; W. M. Baldwin, Case Institute of Technology.

Sat., Nov. 1

VI—Relation Between Residual Stresses and Brittle Weldments

Commentators: W. M. Baldwin, Case Institute of Technology; LaMotte Grover, Air Reduction Co.

VII—Methods for Stress Relieving

Commentators: L. J. Larson, Allis-Chalmers Co.; George A. Butz, Aluminum Co. of America.

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You get more—much more—when you specify and use any of T-J's complete line of Spacemaker cylinders. The Spacemaker is engineered to give you better, more accurate, and longer service—offers, exclusively, many extras . . . that are STANDARD, AT NO EXTRA COST!

Designed to eliminate tie-rods, providing greater strength . . . saves space . . . reduces manhours and costs in all push-pull-lift operations. IMMEDIATE SHIPMENT in a wide range of styles and capacities, with 64,000 combinations. Write for Bulletin SM 155-3 with complete engineering details. The Tomkins-Johnson Co., Jackson, Mich.

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METAL PISTON ROD SCRAPER . . . Standard at No Extra Cost!

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CHROME PLATED CYLINDER BORES AND PISTON RODS . . . Standard at No Extra Cost!

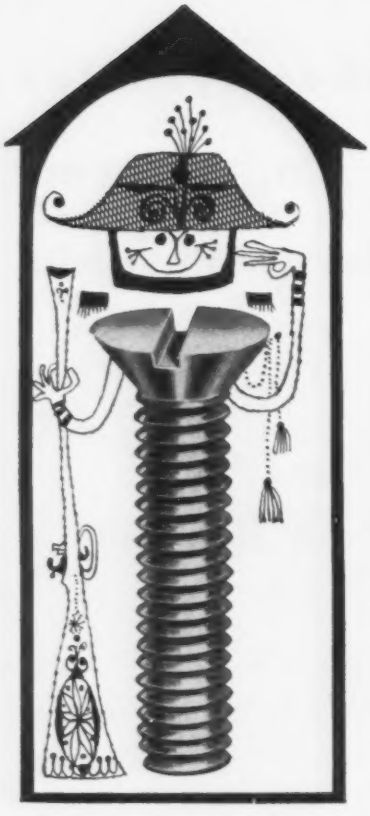
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Whatever you make, make it better of aluminum and fasten it with Alcoa® Aluminum Fasteners. Guard against both galvanic and atmospheric corrosion and get lasting sales appeal with bright, carefree aluminum fasteners. For your requirements, call your nearest Alcoa sales office. Complete stocks of all standard types and sizes of Alcoa Aluminum Fasteners are on hand at your local Alcoa distributor. Look in the Yellow Pages of your telephone directory.

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 269.

Equipment Leasing

Equipment leasing is analyzed in a 20-page brochure. Containing several case histories, it provides charts and statistics on the subject. (United States Leasing Corp.)

For free copy circle No. 22 on postcard, p. 269

Electric Pen

For rapidly marking of any metal, a new electric pen is introduced in a data sheet. Using a 7-v transformer or running off a 6-v auto battery, it's safe, shockless. It handles like a pen, doesn't get uncomfortably hot. Yet, it marks soft, hard or hardened metals. (Newage Industries, Inc.)

For free copy circle No. 23 on postcard, p. 269

Alloy Castings

Reference charts now available cover: (1) carbon and low alloy steel castings; (2) stainless, corrosion and heat resistant alloy steel castings. Charts list: specifications, designations, analysis, physical properties, and heat treatment. (Quaker Alloy Casting Co.)

For free copy circle No. 24 on postcard, p. 269

Vacuum Lifters

Vacuum lifters for handling sheet materials are covered in a brochure of more than 40 pages. It illustrates a number of safe, efficient lifters for a wide variety of sheet sizes. (Vac-U-Mation Div., F. J. Littell Machine Co.)

For free copy circle No. 25 on postcard, p. 269

Steel Bar

An engineering report analyzes a series of improvements in "Stress-proof" steel bars. This improved stock is now available to users for parts requiring strength, excellent machinability and close accuracy. Yield strength is 100,000 psi in all sizes. (La Salle Steel Co.)

For free copy circle No. 26 on postcard, p. 269

Motors

Open-type "super sealed" motors for many jobs once needing enclosed designs are described in a bulletin. Available in all hp frames, the motors are unaffected by moisture, dust, dirt, oils, acids, and alkalies. (Allis-Chalmers Mfg. Co.)

For free copy circle No. 27 on postcard, p. 269

Storage Structures

Storage structures and related materials handling equipment are subjects of a bulletin. It covers a wide range of equipment, including glass and epoxy lined tanks, square, round, vertical and horizontal units. (Sprout, Waldron & Co., Inc.)

For free copy circle No. 28 on postcard, p. 269

Drilling Unit

Cost-cutting features of a high-speed sensitive drilling machine appear in an 8-page bulletin. This

machine is designed to save space, labor and material for makers of small components. One to six spindle models come in 7 and 10-in. overhangs; speeds range from 625 to 10,000 rpm. (Edlund Machinery Co.)

For free copy circle No. 29 on postcard, p. 269

Die Bases

A maker of nested plastic molds and die bases has prepared a catalog and price chart. It covers practically all possible types of bases for plastic molding. (Columbia Engineering Co., Inc.)

For free copy circle No. 30 on postcard, p. 269

Barrel Finishers

Barrel finishing equipment of a new type is announced in a bulletin. It explains how the equipment uses a unique principle of slow barrel rotation plus vibration. This means quick work, no damage. (Metal Finish, Inc.)

For free copy circle No. 31 on postcard, p. 269

Pyrometer

Introducing a new model surface pyrometer is a company's bulletin. It describes a versatile double-range instrument for surface or sub-surface temperature measurements. Low range scale (0 to 500°F) appears in black, subdivided into 5° divisions; high range calibrations are in red (0 to 1500°F). (Pyrometer Instrument Co., Inc.)

For free copy circle No. 32 on postcard, p. 269

Iron Powder

A 52-page book contains technical data on types CDF and MS iron powders. Most information regarding a powder's behavior can be read from the curves on a single set of ordinates in the book. It also lists specifications for each iron powder and shows test shapes and calculation methods. (Republic Steel Corp.)

For free copy circle No. 33 on postcard, p. 269

Boring Mills

New floor type horizontal boring, drilling, and milling machines.

FOOTE BROS. **Motorized Drives**

Duti-Rated LIFETIME GEARING

Gives You More Power Per Dollar



FOOTE BROS.-LOUIS ALLIS **GEARMOTORS**

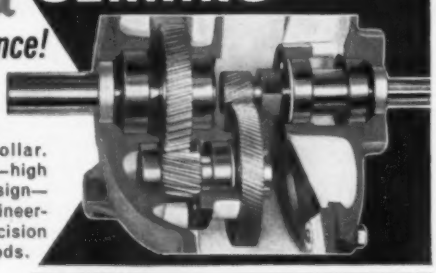
1 to 150 HP...Single, Double, Triple, Quadruple Reductions . . . Output Speeds from 780 to 7.5 RPM

Foote Bros.-Louis Allis Gearmotors are available in over 3500 types and sizes. Foot or flange mountings. Motors can be ordered in any type—open drip-proof, totally enclosed, explosion proof, etc. to meet your requirements.

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FOOTE BROS. **Line-O-Motor**



1 to 75 HP...Double, Triple Reductions... Ratios: 5:1 thru 238:1

Line-O-Motor Drives accept any NEMA frame motor . . . permit you to use your own motor or specify type to meet plant standardization. Foot or flange mounted.



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FREE LITERATURE

with 4- and 5-in. spindles, are outlined in a 12-page catalog. Full pendant control, optional column heights, Tele-Vernier measuring system, auxiliary work - holding units, and accessories are among features described. (Cincinnati Gilbert Machine Tool Co.)

For free copy circle No. 34 on postcard, p. 269

Packing, Shipping

In its 18th edition, a catalog is full of thoughts to improve packing and shipping methods. The 48-page booklet recommends various shipping ideas for rail, truck or intra-plant handling. Also included is data on: power strap feeders; electric, pneumatic, and manual strapping tools and accessories. (Signode Steel Strapping Co.)

For free copy circle No. 35 on postcard, p. 269

Rolling Mills

Calculations of bearing loads for hot and cold rolling mills are described in a 16-page catalog. Covered are: rolling of rectangular sections; rolling in gothic, diamond, square, oval and round passes; calculation of rolling loads and bearing life in cold rolling of strip, and calculation of power requirements in hot and cold rolling. SKF Industries, Inc.)

For free copy circle No. 36 on postcard, p. 269

Materials Handling

Auxiliary materials handling equipment is described in an 8-page brochure. It covers clamp roll carts, work benches, portable steel racks, trucks and other equipment for in-plant usage. (Conveyor Systems, Inc.)

For free copy circle No. 37 on postcard, p. 269

Indexing Device

A special machinery firm's new folder introduces its 24-in. Super Spacer indexing device. (Hartford Special Machinery Co.)

For free copy circle No. 38 on postcard, p. 269



precise heat for precision casting

You'd *expect* the accurate heat of an induction furnace to be an important consideration in permanent mold, shell mold, and investment casting . . . and it *is!* But in addition to precise temperature control, Ajax-Northrup high frequency induction furnaces provide the precision foundry with *flexibility*, *purity*, and *economy*. That's why Ajax leadership in melting for precision casting has never been challenged.

One furnace—hundreds of alloys: Ajax-Northrup furnaces can handle any one or all of the hundreds of ferrous and non-ferrous alloys being made today. For many alloys, it's the only furnace that *can* be used. Magnet alloys, for example, depend on the inherent stirring action which assures ideal dispersion of all elements throughout a melt . . . and the most uniform possible cast part analysis.

Pure metal protects part quality: There's no flame, no smoke, no physical contact between coil and metal. Melts are always 100% on analysis, because there's no chance of contamination . . . particularly important when you're dealing with the finicky alloys common in precision casting.

A better melt at a lower cost per melt: Because every melt is uniform and to exact composition, bad melts become a thing of the past. Subsequent machining is minimized. Ajax-Northrup's unique control system assures maximum melting efficiency—lower melting costs. And new, compact designs minimize floor space requirements, installation costs and maintenance.

Induction heating & melting

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Available in every conceivable capacity from a few ounces to several tons . . . powered by massive motor-generator sets or economical converters . . . there's an Ajax-Northrup induction furnace sure to satisfy your needs perfectly. We'll gladly send you further information or, if you wish, arrange a meeting with qualified furnace engineers to discuss your special requirements. Ajax Electrothermic Corporation, Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION

ARISTOLOY

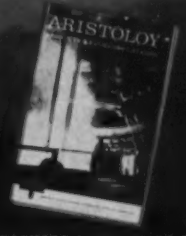
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STAINLESS—300 Series • 400 Series • 500 Series

FURNISHED AS—Hot Rolled Blooms, Billets & Bars • Hot Rolled, Annealed & Heat Treated • Ground Blooms & Billets • Bars—Hot Rolled; Turned; Turned, Ground & Polished; or Cold Drawn with or without Heat Treatment.

BEARING QUALITY • AIRCRAFT • PISTON PIN QUALITY • ELECTRIC FURNACE ALLOY • ELECTRIC FURNACE CARBON • ALLOY BASE ALLOY • ALLOY BASE CARBON



ARISTOLOY STEELS

NEW PRODUCTS & FACILITIES CATALOG
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FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Crane Control

Two new bulletins deal with ac and dc crane control. Bulletins describe master switches, disconnects, limit switches, frequency relays, brakes, etc. (Electric Controller & Mfg. Co. Div., Square D Co.)

For free copy circle No. 39 on postcard

Stud Tightening

Electric stud heaters shown in a bulletin quickly, accurately shrink-tighten large studs and holding bolts. They have uses in making, assembling and servicing of steam pressure vessels, large presses, motors or turbines (where extreme tightness is a must). (Edwin L. Wiegand Co.)

For free copy circle No. 40 on postcard

Flame Cutter

An 8-page booklet gives details of a flame-cutting machine. Portable and motor - driven, this straight-line track-guided machine performs limited contour, circular and curved cutting. (Air Reduction Company, Inc.)

For free copy circle No. 41 on postcard

Leak Detectors

Leak detectors presented in a 12-page bulletin locate leaks in any system or component under pressure or vacuum. (General Electric Co.)

For free copy circle No. 42 on postcard

Wrought Tubes

Cold drawn, wrought iron heat exchanger and condenser tubes are discussed in a 10-page booklet. It cites actual setups which use wrought iron and other metal tubing. This permits service life comparisons. Listed are cost-per-foot-per-year figures for each material. (A. M. Byers Co.)

For free copy circle No. 43 on postcard

Investment Casting

Investment casting is explained in a 2-page flyer. It describes this process, tells when and why it should be used in preference to other casting methods. (Alloy Steel Casting Co.)

For free copy circle No. 44 on postcard

Fire Brick

Newly revised, an 8-page brochure describes how insulating fire brick can cut the cost of controlling heat through 3000°F. It contains a table to help operators and builders of high-temperature industrial equipment select the right insulating fire brick for an intended application. (Johns Manville).

For free copy circle No. 45 on postcard

Worm Drive

An eight-page booklet asks: Why Worm Gear? Then it answers, providing information on worm gearing in general. It points out advantages of this type gearing, giving design and manufacturing facts. (Cleveland Worm & Gear Co.)

For free copy circle No. 46 on postcard

Machine Drives

Two 12-page booklets review a line of adjustable speed dc packaged drives. These drives enable plants supplied with ac only to improve machine performance through the wide speed range and close control possible with dc motors. (Cutler-Hammer Inc.)

For free copy circle No. 47 on postcard

Forming Dies

Forming dies and other castings of gray iron are featured in an 8-page bulletin. Actually, the metal

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FREE LITERATURE

used is a chromium-molybdenum alloyed gray iron. (Advance Foundry Co.)

For free copy circle No. 48 on postcard

Insulation

Impervious insulation systems for motor and generator stator coils are described in a bulletin. The insulation has a base of semi-organic silicone elastomer. This has extreme chemical stability and retention of properties under adverse conditions. (Allis - Chalmers Mfg. Co.)

For free copy circle No. 49 on postcard

Welder

A semi-automatic welder is outlined in a data sheet. (Wall Colmonoy Corp.)

For free copy circle No. 50 on postcard

Cutoff Wheels

Abrasive cutoff wheels are described in a folder. These wheels slice through a wide range of bars, tubes, angles, molding, pipe, etc. (The Peninsular Grinding Wheel Div.)

For free copy circle No. 51 on postcard

Hard Surfacing

Hard surfacing electrodes and wires reviewed in a new catalog serve more than 400 different types of welding equipment. (A. O. Smith Corp.)

For free copy circle No. 52 on postcard

Coolant, Lubricant

Pocket-sized, an 8-page pamphlet describes an oil-less coolant, lubricant and rust preventive. It fits into many different metalworking operations. (Harry Miller Corp.)

For free copy circle No. 53 on postcard

Beryllium Copper

Now offering completely integrated facilities for all beryllium copper requirements is a 4-page bulletin. It describes a plant which turns out quality strip and foil. A complete stocking program on semi-finished strip assures fast delivery of any temper. (Pennrold Div., Brush Beryllium Co.)

For free copy circle No. 54 on postcard

Pneumatic Control

Two booklets, 24 and 28 pages respectively, explain pneumatics. The first discusses devices and fundamentals of air circuitry; the second, basic pneumatic control. (Industrial Products Div., Westinghouse Air Brake Co.)

For free copy circle No. 55 on postcard

Valves

In 92 pages, a catalog describes cast and forged steel valves for industrial applications. A visual index, in the catalog's front shows every valve catalogued, arranged in groups according to type. (Edward Valves, Inc.)

For free copy circle No. 56 on postcard

Floor Trucks

An available circular may aid you in selecting new four-wheel floor trucks. These trucks perform either special or standard materials handling jobs. (Lewis - Shepard Products, Inc.)

For free copy circle No. 57 on postcard

Resists Corrosion

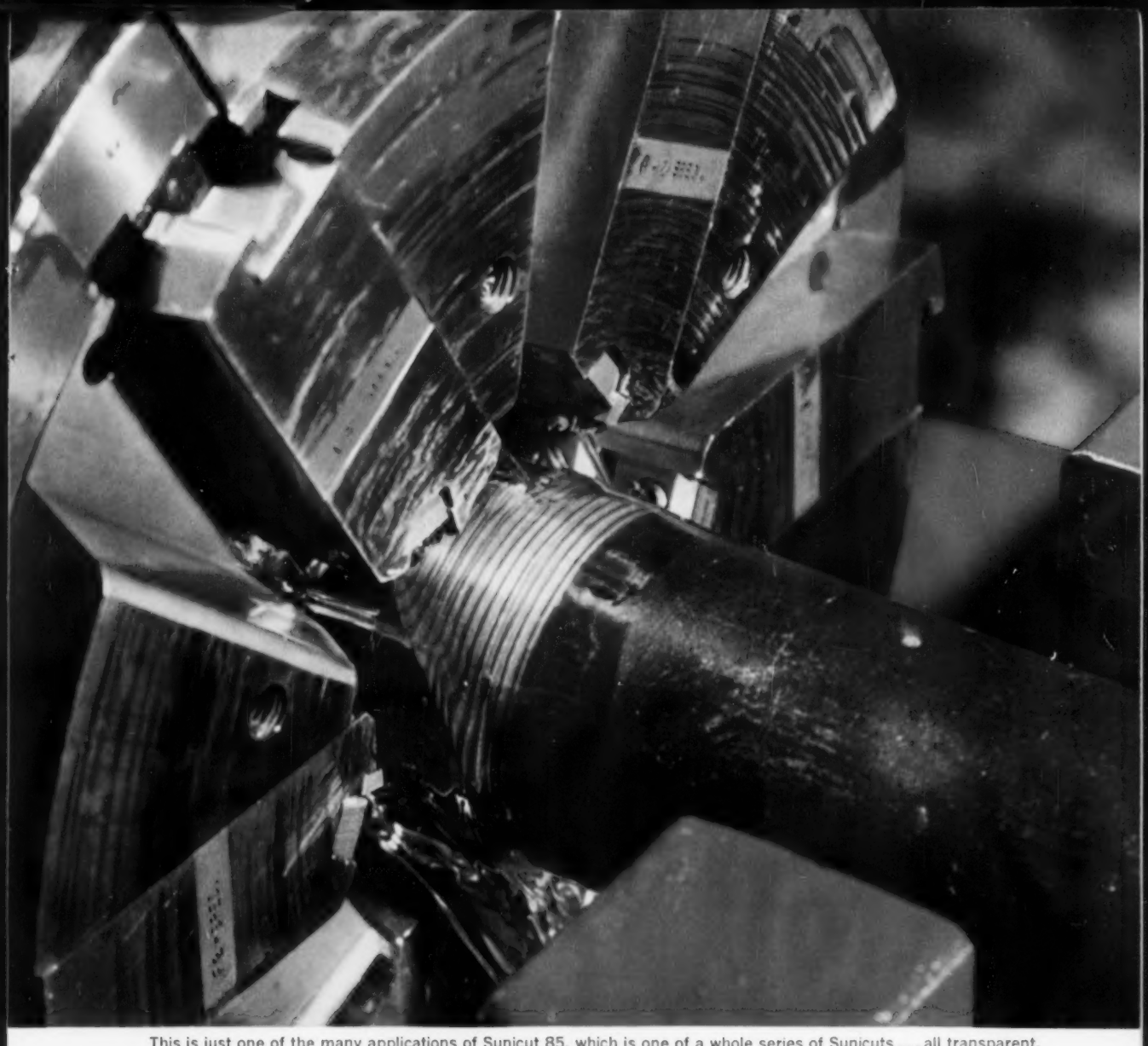
A 4-page catalog details a line of corrosion-resistant fabrications and coatings, components, semi-finished materials, fabricating equipment, and laboratory ware. (American Agile Corp.)

For free copy circle No. 58 on postcard

Bar Automatic

Newest and smallest of one firm's multiple spindle bar automatics offers proved advantages of larger units. The 7/16-in. machine tool handles either long or short run production of small to miniature components where high production rates must be kept compatible with precision. (National Acme Co.)

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This is just one of the many applications of Sunicut 85, which is one of a whole series of Sunicuts . . . all transparent.

SUNICUT 85 is a heavy-duty cutting oil that lets you see what you're doing

Transparent, fast-draining Sunicut® 85 leaves the workpiece clear for inspection as you go.

Especially designed for use on high-alloy steels, Sunicut 85 is ideal for heavy-duty work on automatic screw machines and production form grinders. It's a natural for pipe threading and similar heavy-duty operations requiring frequent and close inspection.

Easy pumping, fast metal-wetting, and excellent extreme-pressure lubrication are other advantages of Sunicut that lead to production economy for you.

Ask your Sunoco representative about saving money with Sunicut, or write to Dept. I-10.

Industrial Products Department

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LPR

Long Production Run COILS

is like buying your wire at a lower price

THE WIRE'S "CHEAPER" BY THE LPR COIL — Buying DSC-Portsmouth Bright Wire (low, medium or high carbon) in LPR coils is like paying less for the steel. That's because you pay nothing extra for the bigger unit packages, and in the bargain they help you reduce your storage, material handling and wireworking costs. For example:

LPR COILS RID YOU OF "RETURNABLES" — LPR coils are self-supporting: won't kink, tangle or topple; need no special carriers or similar contrivances for storage or in transit. They eliminate the "returnables" problem: you avoid the bother of extra bookkeeping; save the additional inbound and outbound freight charges on "loaners" and spare yourself the nuisance and the responsibility of material handling and storage of vendor property.

LPR COILS CUT HANDLING COSTS — They unload faster; conserve storage space; save time and effort in inventory control; lessen material traffic from stock to production line.

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The Iron Age Summary

Inventory Switch Helps Market

More steel buyers are switching to a policy of inventory buildup.

This is contributing to the growing strength of the market. Fourth quarter could be better than earlier forecasts.

▪ Inventory rebuilding is giving the steel market pickup an added push. More steel buyers have begun to rebuild their stocks in view of the gathering strength of the market. These buyers are hedging against a possible supply pinch later in the year.

Steel mills report business is a lot better than they had expected despite scattered strikes in the auto industry. October business is better than September's, and November orders are coming in at a good pace. For some mills last week was the best for the year to date.

The Trend—Steel market analysts say inventory thinking has turned in the direction of greater steel stocks. They estimate steel users will buy a minimum of 200,000 tons over and above actual production needs in fourth quarter, with a possible maximum of one million tons.

Even if the top figure is right, there will only be about four days' supply added to stocks. Allowing for increased output, many plants will end the year with shorter reserves than they now have.

Reverse English? — The steel market picture in the next few months could easily be the exact reverse of what it was earlier in the year, when user inventories were on the way down. At that time the mills were battling on two fronts: Inventory cutbacks and a slow economy. With business generally now on the upswing, inventory rebuilding would be all the mills need to carry their market through a strong fourth quarter.

Auto plant shutdowns over local labor issues is tending to be a drag on the market, but not enough to slow the upward trend. Some auto plants have asked the mills to delay shipments pending settlement of the walkouts. But over-all automotive demand is still good.

Behind Optimism—Contributing to mill optimism is the fact that their market is getting stronger despite lack of orders from two major industries—the railroads and oil and gas. These industries are expected to step back into the market late this year or early next year.

Meanwhile, more steel companies report a growing backlog of orders for some products, especially sheets and strip, galvanized sheets, and bars. This reflects increasing demand from the appliance, farm equipment, and automotive industries.

Delivery Stretchout — As the market tightens, steel buyers are tending to order farther ahead than was the case several months ago. The mills are no longer in position to promise the prompt delivery they could give earlier. In a growing number of instances they are lagging somewhat in meeting delivery deadlines.

Steel Output, Operating Rates

	This Week	Last Week	Month Ago	Year Ago
Production (Net tons, 000 omitted)	1,998	1,944	1,782	2,048
Ingot Index (1947-1949=100)	121.5	120.9	109.7	127.5
Operating Rates				
Chicago	87.0	85.5*	78.0	82.5
Pittsburgh	68.0	66.0*	61.0	81.0
Philadelphia	77.0	76.5	73.5	89.0
Valley	56.0	54.0*	52.0	76.0
West	73.0	69.0*	79.0	100.0
Cleveland	80.0	74.0*	57.0	87.5
Buffalo	78.0	66.0	54.0	100.0
Detroit	79.0	75.0	65.0	93.0
South	66.0	66.0	54.0	73.0
South Ohio River	77.0	73.0*	74.0	86.5
Upper Ohio River	84.5	83.5*	70.5	99.5
St. Louis	92.0	83.0*	72.0	77.0
Aggregate	74.0	72.0	66.0	82.0

*Revised

Prices At a Glance

(Cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	5.967
Pig Iron (gross ton)	$66.41	$66.41	$66.41*	$66.42
Scrap, No. 1 hvy (Gross ton)	$42.50	$42.83	$43.17	$39.33
No. 2 bundles	$28.50	$28.83	$29.17	$29.17
Nonferrous				
Aluminum ingot	26.80	26.80	26.80	28.10
Copper, electrolytic	27.50	26.50	26.50	27.00
Lead, St. Louis	12.30	11.80	10.55	13.30
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	95.625	96.625*	95.625	91.875
Zinc, E. St. Louis	11.00	10.50	10.00	10.00

Foundries Offer Design Service

Buyers can put engineering service of foundries to good use, says Don Workman of Gray Iron Founders' Society.

Examples show how part redesign cuts down assembly time and lowers product cost.

▪ "A lot of valuable engineering talent in the foundry industry is going begging because industrial purchasing agents are reluctant to let product and foundry engineers get together," says Don Workman, Gray Iron Founders' Society executive vice president.

"We have hundreds of examples where foundry engineers have been able to redesign cast parts or convert them from other fabrication methods at a major saving or improvement in quality.

Willing Engineers — "Many of our founders now have staff engineers who are begging for a chance to be of service. In many cases the engineering will be done free to get the job. The foundries with sales engineers are not always the cheapest, but they're among the best and have stayed on top because they are selling a casting service—not just pounds of iron," Mr. Workman says.

A few examples are:

An Indiana foundry redesigned a compressor crankshaft for a refrigerator manufacturer from a complicated piece to a relatively simple one. This eliminated extensive alloying and permitted accuracy to 1/32-in. in the castings.

Easier and Cheaper—An eastern foundry redesigned an 8-part handle for a calculating machine into a single casting at a 78 pct cost reduction. The crank previously was assembled from screw machine parts, a forging, and a cut spur gear. The new gray iron shell molded casting needs only wire brushing, polishing of the handle, and cadmium plating of the cast gear teeth and it's ready for use.

Another foundry engineer visited a machinery exhibit and found eight possible savings through castings in just one product. When he mentioned this, company officials came running. They threw out three but found eighteen more themselves. If the foundryman had been allowed in the customer's shop in the first place, he probably would have spotted many more.

Specs Not Enough—Purchasing of castings is also becoming more complicated. So purchasing agents can't fall back on standards. Society officials point out that castings can't be adequately bought on the basis of standard specifications alone because these do not stipulate all of the individual requirements that may be necessary.

There are instances where product engineers specify Brinell hardness to get strength although the two are not directly related. Also high strength iron has been specified for applications where strength is not a factor because "high strength" carried a quality connotation. And chemical analysis has been made of a particularly good casting and written into specs for others when the chemistry was incidental to the success.

Tour, Talks and Books—A part of the major gap between foundry engineers and their customers is continuing to be filled by foundry tours coupled with educational programs.



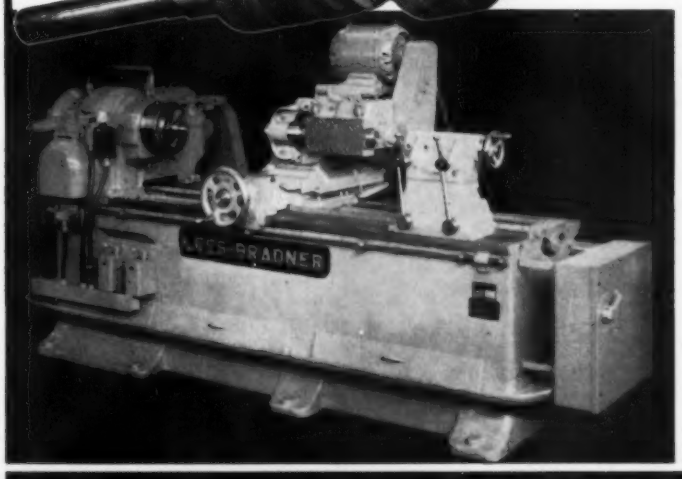
READY TO SERVE: Foundries are ready with specialized service to help customers get the right product at the right cost.



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Building precision into other machine tools is a unique feature of The Lees-Bradner Model HT Thread Milling Machine.

The worm illustrated above was produced by the Cleveland Worm and Gear Co. in one hour 23 minutes at a cutter spindle speed of 61 R. P. M. The pitch diameter of the worm was 3.728" with an outside diameter of 4.625".

Contact Lees-Bradner for complete information on fast, precision threading with the Model HT Universal Thread Milling Machine.

Details on Worm Gear Production

Hob Spindle Speed	61 R. P. M.
Circular Pitch	1.420"
Pitch Diameter	3.728"
Outside Diameter	4.625"
Threading Time	1 hour 23 min.
Material	2315 Steel
Weight of Worm	51.76 lbs.

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Fourth Quarter Gain Will Be Widespread

Upturn in demand is boosting sales for the majority of steel products.

Only pipe, structurals, and plate are still lagging.

▪ Fourth quarter sales gains will be chalked up by the majority of steel products.

The present upturn in demand is fairly widespread—affecting sheet, strip, bar, tinplate, wire, and standard pipe. Lagging behind are the heavier steel products including oil country goods, linepipe, plates, and shapes.

Here are the sales trends and prospects for major steel products during the balance of '58:

Sheet order volume, despite some deferments by auto steel buyers, continues heavy. After local auto plant shutdowns are settled, the steel buying pace at Detroit will pick up. Then a further tightening in sheet can be expected.

Bar users are encouraging mills by more forward buying. In some cases customers found it necessary because deliveries were stretching out too far for comfort. But the advance thinking also reflects the improved economic climate.

Tinplate mills believe buyers will stock up before higher prices go into effect Nov. 1. Wire mills are operating at their best level in a long while. Standard pipe sales are improving despite jobber discontent about lower discount schedules on their mill orders.

For the lagging steel products the long-range outlook is encouraging.

Sheet and Strip — Buyers are ordering farther ahead. Some users admit they are advancing orders from November into October and from December into November. Automotive steel buyers are still lagging to a degree. But appliance makers and steel service centers, to name two, are helping boost sheet and strip demand. One **Midwest** mill reports the heaviest bookings for any week this year during the first week in October. Galvanized sheet is still in heavy demand. Orders for hot-rolled and cold-rolled sheet and strip are extending mill deliveries.

Bar—Hot-rolled bar users are showing more interest in advance bookings. Some mills are already getting orders for November and December delivery. This is partly due to the tightening situation in bar deliveries. Buyers can still get some products in one or two weeks. But the list of these is steadily dwindling. Some bar mills are promising shipments based on 30-day rolling cycles. However, in cases, they are not able to cut rolling schedules below 45-day levels. Cold finished bar producers also report sales gains.

PURCHASING AGENT'S CHECKLIST

Inquiries about foundry equipment are picking up. **P. 158**

New ultra-high strength steel developed at Ford. **P. 161**

How to get more from special ferrous alloys. **P. 185**

Pipe—Standard pipe sales continue gaining. However, jobbers are discontented over the cut mills made in their discounts on direct shipments. This unhappiness hasn't hurt mill orders yet. However, it may bring more moves modifying the discount structure. East Coast pipe markets are still filled with European imports. Shiploads of buttweld are coming into Philadelphia, New York, and Boston ports. Most of it is coming from Germany. Also arriving from the same area: Forge pipe for use in boiler construction work.

Wire Products—Wire mills are now operating at about 75 pct of capacity on a nationwide basis compared with about 50 pct a month or so ago. Two major reasons are renewed buying by users of manufacturers wire and by fastener makers. **Midwest** wire producers in the area from Pittsburgh to Chicago are busiest. **East Coast** and **New England** mills are operating at a lower level.

Tinplate — Demand from users has risen since announcement of higher mill prices after Nov. 1. Seasonal factors are working against any widespread boost in orders. However, some tinmills expect buyers to clean out mill backlogs. **Midwest** tinplate producers say orders have quadrupled since the price announcement was made. Some canmakers are reported already doing some hedge buying against a possible steel strike in 1959.

Steel Service Centers—Distributors still expect October business will show a 10-15 pct gain over September. One hitch to current sales is the low level of warehouse sheet stocks. If the service centers can get new orders filled by the mills, they stand a good chance of moving the steel on to their buyers. However, the delivery situation is now in a scramble. Some **Midwest** warehouses have placed orders with **Eastern** mills for November sheet.

COMPARISON OF PRICES

(Effective Oct. 14, 1958)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**: declines appear in *Italics*.

	Oct. 14 1958	Oct. 7 1958	Sept. 16 1958	Oct. 15 1957
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	4.925¢
Cold-rolled sheets	6.275	6.275	6.275	6.05
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.60
Hot-rolled strip	5.10	5.10	5.10	4.925
Cold-rolled strip	7.425	7.425	7.425	7.17
Plate	5.30	5.30	5.30*	5.12
Plates, wrought iron	13.55	13.55	13.55	13.15
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.30	$10.30	$10.30	$10.30
Tin plates, electro (0.50 lb.)	9.00	9.00	9.00	9.00
Special coated mfg. ternes	9.55	9.55	9.55	9.55
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.425¢
Cold finished bar	7.65	7.65	7.65	7.30
Alloy bars	6.725	6.725	6.725	6.475
Structural shapes	5.50	5.50	5.50	5.275
Stainless bars (No. 302)	45.00	45.00	45.00	45.00
Wrought iron bars	14.90	14.90	14.90	14.45
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	7.65¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.525
Light rails	6.725	6.725	6.725	6.50
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$77.50
Slabs, rerolling	80.00	80.00	80.00	77.50
Forging billets	99.50	99.50	99.50	96.00
Alloy blooms, billets, slabs	119.00	119.00	119.00	114.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.15¢
Skelp	5.05	5.05	5.05	4.875
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	5.967¢

	Oct. 14 1958	Oct. 7 1958	Sept. 16 1958	Oct. 15 1957
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57*	$70.51
Foundry, Southern Cin'ti	73.87	73.87	73.87	71.65
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07*	70.01
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41*	$66.42
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$44.50	$44.50	$44.50	$38.50
No. 1 steel, Phila. area	*40.50*	41.50	39.50	37.00
No. 1 steel, Chicago	42.50	42.50	45.50	36.50
No. 1 bundles, Detroit	35.50	32.50	36.50	29.50
Low phos., Youngstown	45.50	45.50	45.50	38.50
No. 1 mach'y cast, Pittsburgh	51.50	51.50	51.50	52.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	50.50
No. 1 mach'y cast, Chicago	53.50	53.50	53.50	43.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	*$42.50*	$42.83	$43.17	$37.33
No. 2 bundles	*28.50*	28.83	29.17	27.67
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.50	$14.50	$15.38
Foundry coke, prompt	$18-18.50	$18-18.50	$18-18.50	$17.50-$19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	**27.50**	26.50	26.50	27.00
Copper, Lake, Conn.	**27.50**	26.50	26.50	27.00
Tin, Straits, N. Y.	*95.625*†	96.625*	95.625	91.875
Zinc, East St. Louis	**11.00**	10.50	10.00	10.00
Lead, St. Louis	**12.30**	11.80	10.55	13.30
Aluminum, virgin ingot	26.80	26.80	26.80	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	33.00

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighed index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite:

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

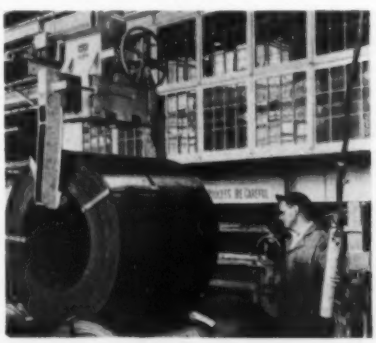
Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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TELESCOPING Coil Grab Permits Extra CLOSE PILING

As shown, this Mansaver Style 1362 Coil Grab can stack coils evenly, close together and higher because of its telescoping construction. The increased storage space thus obtained will make the purchase of Mansaver Grabs much cheaper than new buildings. Mansaver Coil Grabs are obtainable for vertical as well as horizontal handling; hand or motor-operated or fully automatic. Write for names and addresses of neighboring plants where you can see Mansaver Grabs in operation.

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Also Manufactured in England

Market Is Bullish, Prices Hold Firm

There are exceptions in some districts, but on the whole the market is steady.

Operating rate is nearing a point where mills must buy dealer scrap.

■ Scrap dealers are holding on doggedly for higher prices. A steadily climbing steel operating rate is working in their favor.

The critical level for mill operations is about 80 pct, scrap men feel. If operations go over this point, mills will lose the flexibility that excess blast furnace capacity now affords. In several districts, mills already are operating above that level.

But a climbing steel operating rate goes hand-in-hand with increased industrial activity, and growing tonnages of industrial scrap are appearing on the market scene to compete with dealer grades. The industrial lists can be expected to temper dealer prices even though the mill operating rate climbs well into the 80's. Mills have healthy scrap inventories to begin with.

While there is a strong undertone to the market, on the surface some weakness is apparent and there is still room for fluctuation. In the Philadelphia district, one mill came into the market at $1 under quoted levels, sending The IRON AGE heavy melting Composite Price down 33¢ to $42.50.

Pittsburgh—Prices of most grades are holding firm. Mill buying is still on a limited scale but prices of top openhearth grades have held up, and there is no indication they are ready to weaken. Available No. 1 heavy melting is prime quality and strongly held. Yards have been paying over $40 for unprepared railroad scrap, reflecting confidence in future price level of $45 or higher for No. 1 grades. Auto work stoppages have reduced the flow of industrial scrap sharply and strong bidding is expected on next month's lists.

Chicago—In a confused market, smaller mills continued to buy scrap at existing price levels. But prices are too low to bring out any volume of scrap. Movement out of the area continues. With mill operating rates rising, dealers are reluctant to sell large quantities of scrap at quoted prices. Foundry buying is rising slowly.

Philadelphia — Prices of openhearth scrap dropped $1 when a district mill came into the market for a sizable tonnage of No. 1 heavy melting and No. 2 bundles. But with operating rates climbing, prices are not expected to go much lower, if at all. Heavy breakable cast is down $1.

New York—Most grades are unchanged as this market remains steady. Many look for a rise in next week or two as metalworking and steel consumption continue to rise. Stainless grades are up selectively as more mills come into the market.

Detroit — The price of dealer scrap, which moved downward with industrial lists earlier this month, has regained much of the lost ground due to support from outside markets. Firm sales of No. 1 and No. 2 heavy melting have been made at $3 and $4 over the quoted market. A number of other grades brought higher-than-quoted prices.

Cleveland — Tonnage is moving on old orders and underlying strength is still felt, but no price increase is in the making. Dealer grades are plentiful except for prime grades.

St. Louis—Steel mills are buying at quoted prices, and the market remains steady. One mill's reduction of $1 was restored after a week. It caused some slowdown in scrap movement. One railroad withdrew its lists of about 2000 tons of scrap. Railroad specialties are off $1 and cast iron wheels are up $4.

Birmingham — Prices for basic scrap set last week remain prevalent in the South. Dealers are filling these orders and some report stockpiles are being cut into rather sharply because more scrap is moving out of the yards than in. Export activity is picking up.

Cincinnati—There are few short positions since dealers feel the present lull is temporary. Shipments are good on old orders and are expected to continue next month. Upriver prices are not high enough to draw off much tonnage.

Buffalo—Market is inactive and prices unchanged. Dealers expect no new business until next month. Scrap receipts from Lakes shipping has increased a little to give ample supplies before the season ends.

Boston — Dealers expect higher prices. Little material is coming into yards. No. 2 bundles price is nominal. The grade is hard to sell.

West Coast—Until mills feel a more definite pickup in business, the scrap market will probably remain on dead center. No one sees any significant price changes in the immediate future.

Houston—The market is quiet and somewhat weaker. Prices are unchanged. Movement of baling scrap is off because two processors are out of operation temporarily.

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ORTON, *first* with *Torque-Control*, *first* with air-operated controls, *first* to apply new techniques *which have been proved*, is also the *first* to recognize that *each handling job is unique*, thus, an ORTON crane is built for *you*—*your* job—*your* specification.

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EVERY ORTON CRANE HAS: *ALL power shafts carried on sealed anti-friction bearings—NO exceptions . . . ALL motion entirely independent . . . NO jaw clutches—not even in travel mechanism.*

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THE MOST POWERFUL NAME IN CRANES

CRANE AND SHOVEL CO.
608 S. Dearborn Street
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SCRAP PRICES *(Effective Oct. 14, 1958)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	44.00 to 45.00
No. 1 factory bundles	48.00 to 49.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	44.00 to 45.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	24.00 to 25.00
Low phos. punch'gs plate	48.00 to 49.00
Heavy turnings	34.00 to 35.00
No. 1 RR hvy. melting	47.00 to 48.00
Scrap rails, random lgth.	54.00 to 55.00
Rails 2 ft and under	57.00 to 58.00
RR specialties	52.00 to 53.00
No. 1 machinery cast.	51.00 to 52.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	225.00 to 230.00
18-8 turnings	125.00 to 130.00
430 bundles and solids	125.00 to 130.00
410 turnings	60.00 to 60.00

Chicago

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	42.00 to 43.00
No. 1 factory bundles	46.00 to 47.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	22.00 to 23.00
Low phos. forge crops	52.00 to 53.00
Low phos. punch'gs plate	48.00 to 50.00
Low phos. 3 ft and under	47.00 to 48.00
No. 1 RR hvy. melting	48.00 to 49.00
Scrap rails, random lgth.	53.00 to 54.00
Rerolling rails	64.00 to 65.00
Rails 2 ft and under	59.00 to 60.00
Angles and splice bars	55.00 to 56.00
RR steel bar axles	71.00 to 72.00
RR couplers and knuckles	52.00 to 53.00
No. 1 machinery cast.	53.00 to 54.00
Cupola cast.	47.00 to 48.00
Heavy breakable cast.	41.00 to 42.00
Cast iron wheels	41.00 to 42.00
Malleable	57.00 to 58.00
Stove plate	44.00 to 45.00
Steel car wheels	51.00 to 52.00
Stainless	
18-8 bundles and solids	215.00 to 220.00
18-8 turnings	125.00 to 130.00
430 bundles and solids	115.00 to 120.00
430 turnings	65.00 to 70.00

Philadelphia Area

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	40.00 to 41.00
Machine shop turn.	20.00 to 21.00
Mixed bor. short turn.	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Shoveling turnings	24.00 to 25.00
Clean cast. chem. borings	30.00 to 31.00
Low phos. 5 ft and under	43.00 to 44.00
Low phos. 2 ft, punch'gs	44.00 to 45.00
Elec. furnace bundles	42.00 to 43.00
Heavy turnings	33.00 to 35.00
RR specialties	47.00 to 48.00
Rails 18 in. and under	57.00 to 58.00
Cupola cast.	40.00 to 41.00
Heavy breakable cast.	42.00 to 43.00
Cast iron car wheels	44.00 to 45.00
Malleable	56.00 to 57.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	32.50 to 33.50
No. 1 dealer bundles	37.50 to 38.50
No. 2 bundles	25.00 to 26.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	18.00 to 19.00
Low phos. 18 in. and under	45.00 to 46.00
Rails, random length	49.00 to 50.00
Rails, 18 in. and under	55.00 to 56.00
No. 1 cupola cast.	44.00 to 45.00
Hvy. breakable cast.	36.00 to 37.00
Drop broken cast.	47.00 to 48.00

Youngstown

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	44.00 to 45.00
No. 2 bundles	29.00 to 30.00
Machine shop turn.	20.50 to 21.50
Shoveling turnings	24.50 to 25.50
Low phos. plate	45.00 to 46.00

Cleveland

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	32.50 to 33.50
No. 1 dealer bundles	41.00 to 42.00
No. 1 factory bundles	43.50 to 44.50
No. 2 bundles	27.50 to 28.50
No. 1 busheling	41.00 to 42.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	21.00 to 22.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Cut structural & plates, 2 ft & under	47.00 to 48.00
Drop forge flashings	41.00 to 42.00
Low phos. punch'gs plate	42.00 to 43.00
Foundry steel, 2 ft & under	40.00 to 41.00
No. 1 RR hvy. melting	44.00 to 45.00
Rails 2 ft and under	56.00 to 57.00
Rails 18 in. and under	57.00 to 58.00
Steel axle turnings	25.00 to 26.00
Railroad cast.	50.00 to 51.00
No. 1 machinery cast.	49.00 to 50.00
Stove plate	45.00 to 46.00
Malleable	61.00 to 62.00
Stainless	
18-8 bundles	220.00 to 225.00
18-8 turnings	115.00 to 120.00
430 bundles	120.00 to 125.00

Buffalo

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 busheling	36.00 to 37.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	27.00 to 28.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	18.00 to 19.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	45.00 to 46.00
Scrap rails, random lgth.	47.00 to 48.00
Rails 2 ft and under	59.00 to 60.00
No. 1 machinery cast.	48.00 to 49.00
No. 1 cupola cast.	44.00 to 45.00

St. Louis

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	29.00 to 30.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
No. 1 RR hvy. melting	45.00 to 46.00
Rails, random lengths	48.00 to 49.00
Rails, 18 in. and under	53.00 to 54.00
Angles and splice bars	46.00 to 47.00
RR specialties	47.00 to 48.00
Cupola cast.	48.00 to 49.00
Heavy breakable cast.	38.00 to 39.00
Cast iron brake shoes	38.00 to 39.00
Stove plate	42.00 to 43.00
Cast iron car wheels	44.00 to 45.00
Rerolling rails	60.00 to 61.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	39.00 to 40.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	39.00 to 40.00
Machine shop turn.	24.00 to 25.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	13.00 to 14.00
Electric furnace bundles	40.00 to 41.00
Elec. furnace, 2 ft & under	37.00 to 38.00
Bar crops and plate	46.00 to 47.00
Structural and plate, 2 ft.	45.00 to 46.00
No. 1 RR hvy. melting	39.00 to 40.00
Scrap rails, random lgth.	48.00 to 49.00
Rails, 18 in. and under	51.00 to 52.00
Angles and splice bars	48.00 to 49.00
Rerolling rails	59.00 to 60.00
No. 1 cupola cast.	54.00 to 55.00
Stove plate	52.00 to 54.00
Cast iron car wheels	43.00 to 44.00
Unstripped motor blocks	43.00 to 44.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	28.00 to 29.00
No. 2 dealer bundles	19.00 to 20.00
Machine shop turnings	10.00 to 11.00
Mixed bor. and turn.	13.00 to 13.00
Shoveling turnings	13.00 to 14.00
Clean cast. chem. borings	24.00 to 25.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	36.00 to 37.00
Heavy breakable cast.	34.00 to 35.00
Stainless	
18-8 prepared solids	185.00 to 190.00
18-8 turnings	85.00 to 90.00
430 prepared solids	70.00 to 75.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	34.00 to 35.00
Drop forge flashings	33.00 to 34.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Heavy breakable cast.	31.00 to 32.00
Mixed cupola cast.	40.00 to 41.00
Automotive cast.	45.00 to 46.00
Stainless	
18-8 bundles and solids	200.00 to 205.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	105.00 to 110.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	12.00 to 13.00
Clean cast. chem. borings	20.00 to 21.00
No. 1 machinery cast.	33.00 to 34.00
Mixed cupola cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	32.00 to 33.00

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	28.00
No. 2 bundles	22.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 cupola cast.	45.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	28.00
No. 2 bundles	17.00
Machine shop turn.	11.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furn 1 ft and under (foundry)	43.00
No. 1 cupola cast.	44.00

Seattle

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	26.00
No. 1 dealer bundles	30.00
No. 2 bundles	23.00
Mixed steel scrap	25.00
Busheling	20.00
Bush., new fact., prep'd	30.00
Bush., new fact., unprep'd	24.00
Machine shop turn.	15.00
Short steel turn.	19.00
Mixed bor. and turn.	15.00
Rails, rerolling	39.00
Cast scrap	$39.00 to 41.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	34.00
No. 2 bundles	25.00
Machine shop turn.	17.00
Shoveling turnings	20.00
Cut structural plate	
2 ft & under	$44.50 to 45.50
Unstripped motor blocks	36.50 to 37.50
Cupola cast.	45.50 to 46.50
Heavy breakable cast.	30.00 to 31.00



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Will Better Buying Hold into 1959?

This quarter will be the year's best.

But the industry wonders if it will hold into next year. Here are the main factors.

▪ The fourth quarter is barely underway, and already nonferrous metal men are focusing on next year. The reason: This quarter is generally considered to be in the bag. It'll be the best of the year.

But the reason the markets are firming will decide what the picture will look like in the first quarter 1959.

Without exception, sales and shipments of nonferrous metals are at a high for the year, and moving up. The firming has already shown up in higher prices for some metals. And the exceptions are likely candidates for an increase before the year is out.

Production facilities that were down during the depths of the recession are slowly but surely being started up again.

Answers Needed—The question is, "Does the increased buying mean a proportionate increase in the business of fabricators? Is some of it a hedge against special situations in the various markets? Are fabricators rebuilding inventories in anticipation of the business they hope they will get?

Most sellers are ready to believe fabricator business really has improved. But they concede that just before prices started turning up it was obvious the price bottom had been reached—a perfect time for inventory rebuilding. And they have been saying all along that customer inventories were approaching rock bottom.

Here's the picture, metal-by-metal:

Copper—U. S. producers, normally the last to react to market pressure, moved their price up 1¢ per lb, to 27½¢. Custom smelters had been doing good business at that level for a week or so before the producers moved. Some observers say smelters are likely to move even higher.

The catch here is that there are three strikes of some proportions cutting supply. Some sellers believe a number of purchasing agents are betting on long strikes and laying in metal they don't need right now.

Also, with the embargo on shipments to Iron Curtain countries lifted, some metal is finding its way to Russia. But just how sustained Russia's buying will be, and her motives, is a question mark.

Lead and Zinc—Buyers appear to be trying to figure out the market after a bang-bang series of price hikes. Sales have tailed off somewhat, but not below what most sellers call "satisfactory levels."

Before the market started to ease, enough pressure had built up to where John L. Kimberly, executive vice president, American Zinc Institute, felt in necessary to say that "consumers of Special High Grade Zinc need have no fear of shortages."

Bunker Hill Co. one of the major U. S. producers, thinks enough of the firming market to put its smelter on a 6-day week.

Aluminum—Business is definitely picking up. But optimism is the trademark of this industry, so it is hard to tell precisely how fast and how much markets are firming.

Producers haven't raised prices since August when they went up just 7/10¢ per lb because of a round of wage hikes. If things are getting as good as some say prices are almost sure to go up about 1¢ per lb this quarter.

Perhaps the best indicator is the rate at which facilities are being put back to work.

Alcoa has just started up a potline at its Point Comfort, Tex., plant; and is beginning production on a new line at Massena, N. Y. "Improving business conditions were a definite factor in the decision to activate these production facilities," said J. D. Harper, manager of Alcoa's smelting division.

Kaiser is starting up another of its potlines at Mead, Wash., leaving only one idle of a total of eight at that plant. Improved demand was given as the reason.

Reynolds is scheduled to restart a line at Troutdale, Ore., this month.

Tin prices for the week: Oct. 8—96.375; Oct. 9—96.25; Oct. 10—95.625; Oct. 13—95.625; Oct. 14—95.25.*

*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	24.70	24.00	8/1/58
Aluminum ingot	26.80	26.10	8/1/58
Copper (E)	27.50	26.50	10/13/58
Copper (CS)	27.50	27.00	10/8/58
Copper (L)	27.50	26.50	10/13/58
Lead, St. L.	12.30	11.80	10/8/58
Lead, N. Y.	12.50	12.00	10/8/58
Magnesium ingot	36.00	34.00	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	84.50	12/6/58
Titanium sponge	185-205	200-250	4/1/58
Zinc, E. St. L.	11.00	10.50	10/8/58
Zinc, N. Y.	11.50	11.00	10/8/58

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic, (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see above; other primary prices, pg. 284.



what's Volco doing here?

When the lady presses her foot on the brake pedal, it's VOLCO that helps stop the car. For VOLCO alloy wire, woven with the asbestos, makes for the strongest, surest, safest brake lining. Which is why VOLCO, today, is the largest supplier of brake lining wire to the automotive industry. In the safety field, you don't take chances. Brake lining men know that VOLCO takes no chances in the processing of the highest calibre brass alloy wire. Brake lining wire is just one in the field where VOLCO figures so basically. Wherever it is put to work, wire performs an essential service, and manufacturers enjoy the security of knowing that every pound of VOLCO wire is made to specification. Whatever *your* product, it is our pride in our product that means ultimately a finer finished product by you. And remember, VOLCO *is the supplier that is not your competitor!*



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MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1100, 3003	45.7	43.8	42.8	43.3
5052	53.1	48.4	46.9	46.0
6061-0	50.1	45.7	43.9	44.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	42.7-44.2	51.1-54.8
12-14	42.7-44.2	52.0-56.5
24-26	43.2-44.7	62.8-67.5
36-38	48.7-49.2	86.9-90.5

Screw Machine Stock—2011-T-3

Size"	¼	5/16-⅜	½-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type→ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	108.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	50.63	.....	47.86	50.82
Brass, 70/30	44.57	45.11	44.51	47.48
Brass, Low	47.03	47.57	46.97	49.84
Brass, R L	47.89	48.43	47.83	50.70
Brass, Naval	48.84	.....	43.15	52.00
Muntz Metal	46.95	.....	42.76	.....
Comm. Bz.	49.30	49.84	49.25	51.86
Mang. Bz.	52.53	.....	46.76	.....
Phos. Bz. 5%	69.67	.....	70.17	.....

Free Cutting Brass Rod 30.30

TITANIUM

(Base prices, f.o.b. mill)

Sheet and strip, commercially pure, $8.50-$10.10; alloy, $15.95; Plate, HR, commercially pure, $6.00-$6.75; alloy, $8.75-$9.50. Wire, rolled and/or drawn, commercially pure, $6.50-$7.00; alloy, $10.00-$11.50; Bar, HR or forged, commercially pure, $5.25-$5.50; alloy, $5.25-$6.35; billets, HR, commercially pure, $4.10-$4.35; alloy, $4.10-$4.20.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.45
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic basis... $ 1.31
Cobalt, 97-99% (per lb) ....$2.00 to $2.07
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 35.00 to 42.00
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9%, dollars per troy oz..$ 2.25
Iridium, dollars per troy oz. ...$70 to $80
Lithium, 98% ..... $11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York .....$236 to $239
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz...$15 to $17
Platinum, dollars per troy oz...$57 to $60
Rhodium .....$120.00 to $125.00
Silver ingots (¢ per troy oz.) 89.875
Thorium, per kg. $43.00
Vanadium .....$ 3.45
Zirconium sponge .....$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 29.00
No. 120 ..... 28.25
No. 123 ..... 27.00
80-10-10 ingot
No. 305 ..... 33.25
No. 315 ..... 31.25
88-10-2 ingot
No. 210 ..... 40.25
No. 215 ..... 36.00
No. 245 ..... 32.75
Yellow ingot
No. 405 ..... 24.00
Manganese bronze
No. 421 ..... 25.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 24.75-25.00
0.60 copper max. 24.50-24.75
Piston alloys (No. 122 type)..24.25-25.25
No. 12 alum. (No. 2 grade)...21.50-22.00
108 alloy 22.00-22.50
195 alloy 25.00-26.00
13 alloy (0.60 copper max.)...24.25-24.75
AXS-679 (1 pct zinc) 21.75-22.25

(Effective Oct. 13, 1958)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 22.50-23.50
Grade 2—92-95% 21.25-22.25
Grade 3—90-92% 20.25-21.25
Grade 4—85-90% 17.50-18.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	23½	22¾
Yellow brass	18	16¼
Red brass	20¾	20
Comm. bronze	21⅝	20¾
Mang. bronze	16¾	15¾
Yellow brass rod ends	17¾	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 23¾
No. 2 copper wire 22¼
Light copper 20
*Refinery brass 21¾
Copper bearing material 20¾
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 23¾
No. 2 copper wire 22¼
Light copper 20
No. 1 composition 20½
No. 1 comp. turnings 20
Hvy. yellow brass solids 14½
Brass pipe 16½
Radiators 16½

Aluminum

Mixed old cast. ..... 12½—13
Mixed new clips ..... 15½—16½
Mixed turnings, dry ..... 13½—14½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 21½—22
No. 2 copper wire ..... 19½—20
Light copper ..... 17½—18
Auto radiators (unsweated). 13 —13½
No. 1 composition ..... 17 —17½
No. 1 composition turnings.. 16 —16½
Cocks and faucets ..... 13¼—13¾
Clean heavy yellow brass ... 11½—12
Brass pipe ..... 13¼—13¾
New soft brass clippings .... 13¾—14¼
No. 1 brass rod turnings .... 11¼—11¾

Aluminum

Alum. pistons and struts .... 5¼— 5¾
Aluminum crankcases ..... 9¼— 9¾
1100 (2S) aluminum clippings 12¾—13¼
Old sheet and utensils ..... 9¼— 9¾
Borings and turnings ..... 6¼— 6¾
Industrial castings ..... 9¼— 9¾
2024 (24S) clippings ..... 10¾—11¼

Zinc

New zinc clippings ..... 4½— 5
Old zinc ..... 3¼— 3½
Zinc routings ..... 2 — 2¼
Old die cast scrap ..... 1¾— 2

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 37-40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 30-32
Clean Monel turnings 30-32
Old sheet Monel 26-28
Nickel silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead ..... 8 — 8¼
Battery plates (dry) ..... 2¾— 3
Batteries, acid free ..... 2½— 2¾

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixer common babbitt ..... 9½—10
Solder joints ..... 13¼—13¾
Siphon tops 42
Small foundry type ..... 10½—10¾
Monotype ..... 10½—10¾
Lino. and stereotype ..... 9½— 9¾
Electrotype ..... 8½— 8¾
Hand picked type shells .... 6½— 7
Lino. and stereo. dross ..... 2¾— 3
Electro dross ..... 2¼— 2½

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3, R3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		15.50 *C11*
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1, T8, M8*	7.575 *W8*		8.40 *W8, S9,J3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, D1,D2,P11*	7.575 *G3*	10.80 *D2*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*			5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *S1, R3*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *F3*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.85 *K1*	9.275 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.325 *J3* 9.30 *C1*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$113.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective Oct. 13, 1958)

STEEL PRICES

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		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.			Cokes* *1.25* lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*		† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.775 *U1*				$10.15 *U1*	$8.85 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*			7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*		$10.15 *B3*	$8.85 *B3*	
	Worcester, Mass.									6.70 *A5*				
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.									6.60 *L1*				
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*							
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*										
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*				
	Sterling, Ill.									6.50 *N4, K2*				
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*				
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*						
	Newport, Ky.	5.10 *A1*	6.275 *A1*											
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*		$10.05 *U1, Y1*	$8.75 *I3, U1,Y1*	7.50 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*	6.875 *G2*								$8.85 *G2*	7.60 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*				
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*								
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, N3,S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *N3, S1*	7.225 *N3, S1*,R3*	7.525 *R3, S1*	9.275 *S1, R3*					$8.75 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*		$10.05 *W5, J3*	$8.75 *U1, J3*	7.50 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*				
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*				$10.05 *W5, W3*	$8.75 *W5, W3*	7.50 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*				
WEST	Fontana, Cal.	5.85 *K1*	7.525 *K1*				8.275 *K1*	10.575 *K1*				$10.80 *K1*	$9.50 *K1*	
	Geneva, Utah	5.20 *C7*												
	Kansas City, Mo.									6.65 *S2*				
	Los Angeles, Torrance, Cal.									7.20 *B2*				
	Minnequa, Colo.									6.65 *C6*				
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*		$10.80 *C7*	$9.50 *C7*	
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*		$10.15 *T2*	$8.85 *T2*	
	Houston, Texas									6.65 *S2*				

* Electrogalvanized sheets.

(Effective Oct. 13, 1958)

*7.425 at Sharon-Niles is 7.225

IRON AGE

STEEL PRICES

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		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.475 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, N. J. Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mass. Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Ohio Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R3*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,S1*	9.025 *C10*	7.925 *S1*	5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		8.625 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, S12*	8.625 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				8.675 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6*	6.425 *B2*				8.675 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Oct. 13, 1958) * Special Quality.

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

(Effective Oct. 13, 1958)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2

High-carbon chromium	.955	D-3, D-5
Oil hardened manganese	.505	O-2
Special carbon	.38	W-1
Extra carbon	.38	W-1
Regular carbon	.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	Plate (*L4, C4, A3, J2*) 15 pct	Plate (*L4, C4, A3, J2*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302				37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 38.75; 1 side, 33.10.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington *C16*	.....	6.50	.....	.....	.....	.....
Ind. Harbor *Y1*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *P5*	.....	.....	.....	.....	.....	14.75
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.50	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.50
Foundry, beehive (f.o.b.)	$18.00 to $18.50
Foundry oven coke	
Buffalo, del'd	$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.65
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	30.50
Neville, In., Pa.	29.25

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1958 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor		12.475	
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30		
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A5*); Granite City (*G2*); Indiana Harbor (*I5*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*N5*); Vandergrift (*U1*); Warren, O. (*R5*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	GRAPHITE Length (In.)	GRAPHITE Price	CARBON* Diam. (In.)	CARBON* Length (In.)	CARBON* Price
24	84	26.00	40	100, 110	10.70
20	72	25.25	35	110	10.70
18	72	25.75	30	110	10.85
14	72	25.75	24	72 to 84	11.25
12	72	26.25	20	90	11.00
10	60	28.00	17	72	11.40
10	48	28.50	14	72	11.85
7	60	28.25	12	60	12.95
6	60	31.50	10	60	13.00
4	40	35.00	8	60	13.30
3	40	37.00			
2½	30	39.25			
2	24	60.75			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅝ to ⅛-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.00
Midwest	17.00

(Effective Oct. 13, 1958)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187		212	193	9.00	9.55
Aliquippa *J3***	173	190			190	9.00	9.675
Atlanta *A8***	175	192		214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	9.10	9.775
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4****	173	190	172	212	196	8.85	9.325
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192		214	198	9.10	9.775
Donora, Pa. *A5*	173	187		212	193	9.00	9.55
Duluth *A5*	173	187		212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187		212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192		217	198	9.25	9.80†
Jacksonville *M4*	184-1	197		219	203	9.10	9.775
Johnstown *B3***	173	190	172		196	9.00	9.675
Joliet, Ill. *A5*	173	187		212	193	9.00	9.55
Kokomo *C9*	175	189		214	195*	9.10	9.65*
L. Angeles *B2*****	‡	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192		217	198*	9.25	9.80†
Minnequa *C6*	178	192	177	217	198†	9.25	9.80†
Monessen *P6*	.....	.....	.....	.....	193	8.65	9.325
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210			213	9.60	10.15
Rankin, Pa. *A5*	173	187			193	9.00	9.55
So. Chicago *R3*	173	187			193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50†
SparrowsPt. *B3***	175	.....	.....	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 11-12¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
National Tube	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Per pound, in ton lots for minus 100 mesh

Sponge iron, 98+% Fe, 100 mesh, freight allowed east of Miss. River, ocean bags, 23,000 lbs. and over ..... 10.5¢
Sponge iron, 98+% Fe, 100 mesh, f.o.b. point of origin for shipment west of Miss. River, 100 lb. bags ..... 9.5¢
100 mesh, cutting and scarfing grade, 100 lb pails ..... 8.5¢
40 mesh, welding rod coating, 100 lb. bags ..... 7.7¢
Canadian sponge iron, del'd in East, 23,000 lbs. and over ..... 10.5¢
Atomized iron powder, 98% + Fe, 40 mesh, f.o.b. point of origin, in 100 lb. bags ..... 7.7¢
Atomized iron powder, 98% + Fe, f.o.b. point of origin, in 100 lb. bags—RZ-365—freight allowed east of Miss. River ..... 10.5¢
Atomized iron powder, 98% + Fe, cutting and scarfing grade, f.o.b. point of origin ..... 8.5¢
Electrolytic iron, annealed, hydrogen reduced, 100 mesh iron powder, f.o.b. point of origin... 10.5¢
imported 99.5+% Fe .... 24.5¢
200 mesh ..... 33.0¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe 57.0¢
Carbonyl iron size 3 to 20 micron, 98%, 99.8+% Fe.. 88.0¢ to $2.85
Aluminum, freight allowed.. 38.00¢
Brass, 5000 lb. lots .....31.0¢ to 46.7¢
Cobalt, reduced, 99.75% f.o.b. point of origin $2.94
Copper, electrolytic ..... 41.00¢
Copper, electrolytic, imported, per lb., New York. 41.9¢
Copper, precipitated, 24,000 lbs. and over, del'd ..... 40.5¢ to 45¢
Copper, atomized .....39.8¢ to 48.3¢
Chromium, electrolytic, 99.85% min. fe .03 mix. del'd $5.00
Lead, f.o.b. point of origin (2000 lbs. or more) ..... 19¢
Manganese, f.o.b. point of origin ..... 46.0¢
Molybdenum, 99% .....$3.60 to $3.95
Nickel .....$1.05 to $1.13
Nickel steel powder, del'd in East, 23,000 lbs. and over 13¢
Solder powder .....13¢ plus met. value

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Machine and Carriage Bolts	Less than Container Price	1-4 Containers	5 Containers	20,000 Lb.
¼" and smaller x 6" and shorter	34	53	58	62
5/16" x 3" x longer than 6"	9	27	34	41
Rolled thread carriage bolts ⅜" & smaller x 6" and shorter	33	46	54	56
Lag, all diam. x 6" & shorter	10	28	35	42
Lag, all diam. longer than 6 in.	*9	13	22	30
Plow bolts, ½" and smaller x 6" and shorter	10	28	35	42

(Add 25 pct for broken case quantities)

	Full case or Keg price
Nuts, Hex, HP reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
C. P. Hex, reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	41
Semi-finished Hex Nuts	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	57
1⅝ in. and larger	51½

(Add 25 pct for broken case or keg quantities)

Finished

⅞ in. and smaller 65

Rivets

	Base per 100 lb
½ in. and larger	$12.25
	Pct. Off List
7/16 in. and smaller	19

Cap Screws

Discount (Packages)

Full Finished H. C. Heat Treat

New std. hex head, packaged	Full Case	
⅝" diam. and smaller x 6" and shorter	54	42
¾", ⅞", and 1" diam. x 6" and shorter	38	23
⅝" diam. and smaller x longer than 6"	..	..
¾", ⅞", and 1" diam. x longer than 6"	..	..
	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	59	48
¾" through 1" dia. x 6" and shorter	45	32

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 7/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Discount Mach. Screws	Stove Bolts
Cartons	60	60
Bulk		
Quantity		
To ¼" diam. incl. } 25,000-and over	60	..
5/16 to ⅜" diam. incl. } 15,000-200,000	60	..

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
Quantity		
In Bulk		
⅝" diam. & smaller } 25,000-and over	15	16

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Rolled elliptical, 18 in. or longer, 5000 lb lots 41.50
Electrodeposited 32.75
Brass, 80-20, ball anodes, 2000 lb or more 45.50
Zinc, ball anodes, 2000 lb lots 16.50
(for elliptical add 1¢ per lb)
Nickel, 99 pct plus, rolled carton, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)
Cadmium 1.55
Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 66.20
Copper sulphate, 100 lb bags, per cwt. 22.15
Nickel salts, single, 100 lb bags.... 45.00
Nickel chloride, freight allowed, 100 lb 82.25
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums 23.70
(Philadelphia price 24.15)
Zinc cyanide, 100 lb 60.75
Potassium cyanide, 100 lb drum N. Y. 45.50
Chromic acid, flake type, 10,000 lb or more 30.44

CAST IRON WATER PIPE INDEX

Birmingham 125.8
New York 138.7
Chicago 140.9
San Francisco-L. A. 148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (18 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.91	9.29	9.40	9.39	13.24*	.....	.....	.....	.....
Baltimore	$.10	8.10	9.00	9.78	8.80	8.76	8.60	8.75	11.80*	16.28	15.28	19.82	19.08
Birmingham		8.18	9.45	10.46	8.51	8.89	9.00	8.99	.....	.....	.....	.....	.....
Boston	.15	9.48	10.54	11.55	9.84	10.17	10.13	10.26	13.49*	16.79	15.81	20.29	19.56
Buffalo	.15	8.40	9.15	11.22	8.90	9.35	9.40	9.30	11.60*	16.34	15.55	19.01	19.30
Chicago	.15	8.40	9.60	10.60	8.66	9.04	9.15	9.14	9.30	16.20	15.20	19.70	18.95
Cincinnati	.15	8.58	9.65	10.60	8.98	9.42	9.71	9.46	11.68*	16.52	15.52	20.02	19.27
Cleveland	.15	8.51	9.69	10.35	8.78	9.28	9.54	9.25	11.40*	16.31	15.31	19.81	19.06
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit	.15	8.66	9.85	10.96	9.03	9.41	9.71	9.45	9.66	15.46	15.48	18.81	19.23
Houston		8.10	8.60	.....	8.15	8.45	8.05	8.10	11.60	16.20	15.25	19.65	18.95
Kansas City	.15	9.02	10.27	11.32	9.33	9.71	9.82	9.81	10.22	16.87	15.87	20.37	19.62
Los Angeles		8.70[5]	11.20-11.80	12.15	9.15	9.10	9.25	9.10	12.95	17.30	16.35	21.30	20.60
Memphis	.15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11*	.....	.....	.....	.....
Milwaukee	.15	8.54	9.73	10.74	8.80	9.18	9.37	9.28	9.54	16.34	15.34	19.84	19.09
New York	.10	8.97	10.23	10.66	9.74	9.87	9.84	10.09	13.31*	16.16	15.60	20.10	19.35
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	8.10	10.00	11.27	8.80	8.85	8.60	8.75	12.05*	16.58	15.58	20.08	19.33
Pittsburgh	.15	8.50-8.60	9.70-9.95	11.00	8.76	9.05	9.15	9.14	11.40*	16.20	15.20	19.70	18.95
Portland		10.00[1]	11.75[2]	13.30[3]	11.95[4]	11.50[5]	11.10[6]	9.85[7]	15.30*	18.50	17.45	20.75	20.25
San Francisco	.10	9.75	11.20	11.40	9.85	10.10	9.95	10.25	13.85	17.05	16.35	21.05	20.60
Seattle		9.95	11.15	12.20	10.00	9.70	9.80	10.10	14.70	17.15	16.80	20.65	20.60
Spokane	.15	10.10	11.30	12.15	10.15	9.85	9.95	10.25	14.85	17.75	16.95	21.55	20.75
St. Louis	.15	8.69	9.94	10.98	9.04	9.42	9.63	9.52	9.93	16.58	15.58	20.08	19.33
St. Paul	.15	8.94	10.19	10.86	8.99	9.45	9.53	9.70[7]	10.16	.....	15.41	.....	19.21

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **All sizes except 18 and 16 gage.

†† 10¢ zinc. ‡ Deduct for country delivery. * C1018—1 in. rounds. [1] 10 ga. x 36" x 120"; [2] 20 ga. x 36" x 120"; [3] 26 ga. x 30" x 96"; [4] 4½" x 1" in lots of 1000 to 9999; [5] sheared plate ¼" x 84" in lots of 1000 to 9999; [6] 3" x 5.70" in lots of 1000 to 9999; [7] M-1020—1-in. rounds in lots of 1000 to 9999; [8] 15 ga. & heavier.

(Effective Oct. 13, 1958)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*			.....
Birmingham *W9*	62.00	62.50*	66.50		.....
Birmingham *U4*	62.00	62.50*	66.50		.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	66.50	67.00	67.50		.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31 0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4* (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.00	23.75	23.25	25.25	—	27.00	39.75	32.25	37.00	—	16.75	—	17.00
Slabs, billets	27.00	30.25	28.00	31.50	32.00	33.25	49.50	40.00	46.50	—	21.50	—	21.75
Billets, forging	—	36.50	37.25	38.00	41.00	40.50	62.25	47.00	55.75	28.25	28.25	28.75	28.75
Bars, struct.	42.00	43.00	44.25	45.00	48.00	47.75	73.00	55.50	64.75	33.75	33.75	34.25	34.25
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	40.00	40.75	42.00	42.75	45.50	45.25	69.25	52.50-52.75	61.50	32.00	32.00	32.50	32.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R3.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton, Massillon, O., *R5;* Harrison, N. J., *D5;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); New Bedford, Mass., *R6;* Gary, *U1* (25¢ per lb. higher).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gar; , *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D5;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R5;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8.*

(Effective Oct. 13, 1958)

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CONTRACT DIVISION
Textile Machine Works, Dept. 171, Reading, Pa.

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 36.75
7-8½% max C, 50-55% Cr, 3-6% max Si 25.75
7-8½% max C, 50-55% Cr, 3% max Si 26.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C $1.31
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.40

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	29.40	14.60
Ton lots	34.65	16.35
Less ton lots	36.25	18.55

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads 25.65
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads 24.25
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.25
Johnstown, Pa.	12.25
Neville Island, Pa.	12.25
Sheridan, Pa.	12.25
Philo, Ohio	12.25
S. Duquesne	12.25

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 14.80
Ton lots packed in bags 17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa., and Neville Island, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads 34.00
Ton lots 36.00
250 to 1999 lb 38.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton (Bulk)	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk 12.80
Ton lots, packed 14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet 15.10
Packed, pallets, 3000 lb up to carloads 16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots, packed	Carloads, packed
96.75% Si, 1.25% Fe..	24.70	23.40
98% Si, 0.75% Fe	24.45	24.15

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth 3.20
Crucible 3.30
High speed steel (Primos) 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb..	2.40	3.30	4.55

(Effective Oct. 13, 1958)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads, bulk ..... 10.35¢
Ton lots ..... 11.70¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.28

Ferrocolumbium, 50-50%, 2 in. x D, delivered per pound contained Cb.

Ton lots $4.00
Less ton lots..... 4.05

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta $3.80

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $240.00

Ferrotungsten, ½ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed ..... 27.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload $5.50

Bortram, f.o.b. Niagara Falls.

Ton lots per pound ..... 45¢
Less ton lots, per pound .... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound ..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over

No. 1 ..... $1.05
No. 79 ..... 50¢

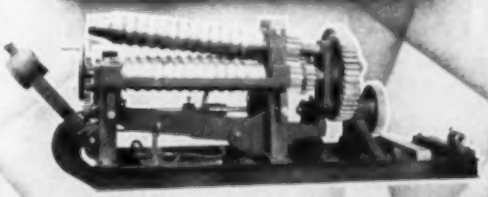
Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

SHEET METAL and PLATE-WORKING MACHINES

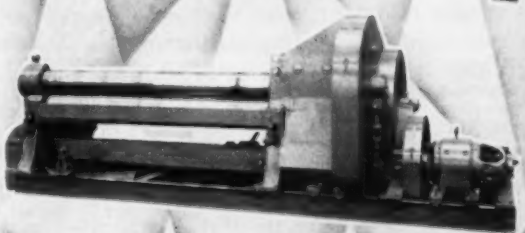
A complete line of heavy machinery for punching, shearing and bending sheet metal and heavy plates. . . .



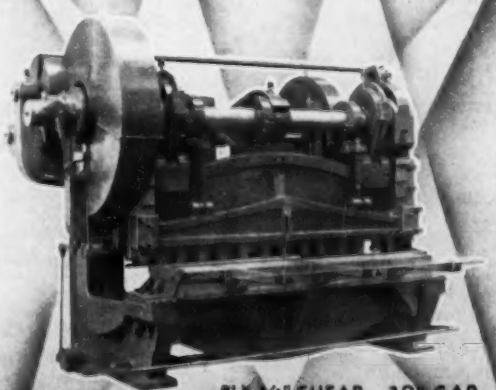
CORRUGATED CULVERT ROLL



PYRAMID TYPE PLATE BENDING ROLL, CAPACITY 1¼"X12'



INITIAL PINCH TYPE PLATE BENDING ROLL, CAPACITY ½"X8'

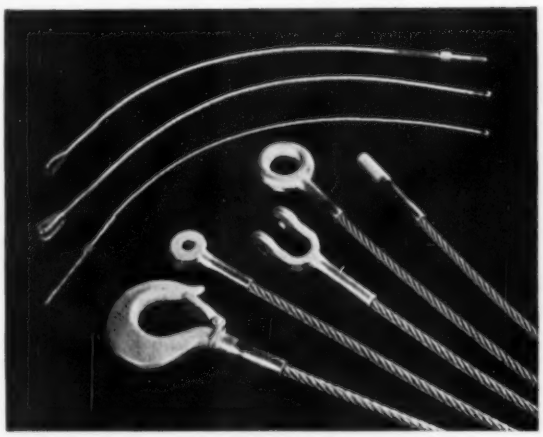


8'X¼" SHEAR, 30" GAP.

BERTSCH & COMPANY

CAMBRIDGE CITY INDIANA

REDUCE PRODUCTION COSTS WITH MACWHYTE PREFABRICATED WIRE ROPE ASSEMBLIES!



You'll save production time by using Macwhyte PREfabricated "Safe-Lock" Wire Rope Assemblies on your equipment because they arrive ready-made for fast, easy installation. Each assembly is precision made to spec — fits "right" every time.

You'll reduce assembly costs because no costly hand operations are required in your plant to cut rope and attach fittings. You know your cost exactly from the start.

MANY STANDARD TYPES AND SIZES ARE CATALOGUED

Assemblies are made to your specifications or we will design assemblies especially for you. All are made in Bright Steel, Galvanized, Stainless Steel, Monel Metal, or Plastic Coated Wire Rope. For further information ask for Bulletin No. 57126. It shows how other manufacturers use PREfabricated "Safe-Lock" Wire Rope Assemblies.

130

MACWHYTE
Wire Rope COMPANY
2906 Fourteenth Avenue, Kenosha, Wisconsin

MILL DEPOTS: **New York 4**, 35 Water St. • **Pittsburgh 36**, P. O. Box 10916, 353 Curry Hollow Road • **Detroit 3**, 75 Oakman Blvd. **Chicago 6**, 228 S. Desplaines St. • **St. Paul 14**, 2356 Hampden Ave. **Ft. Worth 1**, P. O. Box 605 • **Portland 9**, 1603 N. W. 14th Ave. **Seattle 4**, 87 Holgate St. • **San Francisco 7**, 188 King St. • **Los Angeles 33**, 185 S. Myers St.

RAILWAY EQUIPMENT

FOR SALE

Used As-Is Reconditioned

RAILWAY CARS

All Types

SERVICE TESTED

FREIGHT CAR REPAIR PARTS

For All Types of Cars

LOCOMOTIVES

Diesel, Steam, Gasoline
Diesel-Electric

SPECIAL

STANDARD GAUGE CARS

COVERED HOPPER CARS

10-70 ton Capacity

ORE HOPPER CARS

660 Cubic Feet
40- and 50-Ton Capacity

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6,000-, 8,000- and 10,000-Gallon
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Phone: YUkon 6-4766

"ANYTHING containing IRON or STEEL"

REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	K.W.	Make	R.P.M.	Volts D.C.	Volts A.C.
3*	3500	Al.Ch.	514	250/700	13,800/6900 4160
1	2000	G.E.	450	122/265	4160/2400
2*	2000	Whse.	720	600	13,800/6900 4160
2	1250	Whse.	720	600	4160/2400
1	1250	G.E.	450	250	4160/2400
9	1000	Whse.	720	600	4160/2400
3	500	Whse.	1200	125/250	4000/2300
1	450	Whse.	900	240/300	2300
3	300	Whse.	1200	125/250	4000/2300
1*	300	Al.Ch.	1200	250/300	2300
3	200	Whse.	1200	125/250	2300
1	150	Whse.	1200	250	2300
1	150	G.E.	1200	250	4600/2300
2	150	Rel.	1200	125	2300

*—3 Unit Sets.

SPECIAL, before removal (1) 1875-K.W. Whse., M.G. Set, Gen. 250-V.D.C., 514 R.P.M. with 2700-H.P. Syn Motor, 13800/6900/4000-V., 3 ph., 60 cy. with Control.

DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Type	Volts	R.P.M.
1**	3000	G.E.	M.P.C.	300/600	250/360
3***	3000	Whse.	Rev.	525/600	600
1**	2200	Whse.	Mill	600	92/132
8**	1500	Whse.	Rev.	525	600
1**	1250	Al.Ch.	Mill	600	300/600
2**	940	S.S.	Mill	600	800/1000
1**	700	Whse.	Mill	600	143
4**	700	Whse.	Rev.	250	300/700
2**	645	S.S.	Mill	300	1000
1	600	Whse.	Mill	250	110/230
2	600	Al.Ch.	Mill	600	300/600
1	400	G.E.	M.P.C.	270	450
1	300	Whse.	Mill	230	300
2	275	Whse.	Q.M.660.6	250	425/850
1	175	G.E.	C.D.175-A	245	800/1025
1	125	Whse.	SK-184	230	575/850
1	125	Whse.	SK-190	230	450/1000
1	100	Rel.	441-T	250	1150/1500
1	100	Whse.	SK-183	230	450/1000
1	100	G.E.	CD-175	230	400/1200
1	80	Rel.	451-T	230	575/1150
1	80	El.Dy.	25-S	230	525/1050
1	50/60	Whse.	SK-131	230	500/1500
1*	50	G.E.	CD-175	230	400/1200
2*	30/40	Whse.	SK-131	230	500/1500

*—T.E.F.C. **—Enclosed Forced Ventilated. ***—Two Motors in Tandem.

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.

Cable Address "Macsteel" Philadelphia, Pa. Phone Davenport 4-8300

Buying Mood Grows At Detroit

Used machinery customers there are once more seriously considering their needs.

Dealers optimistic as sheet metal equipment and production tools start to move.

▪ Detroit area customers are talking more seriously about what they must have in the way of equipment. Previously, they were talking about what they would like to have. There is now more serious thought being given to purchasing additional or replacement machinery than in any period since last year.

Sheet metal equipment is bringing the largest number of inquiries, particularly for brakes, shears, and punch presses.

Fast Movers—Production equipment, too, has shared in the boost in activity. Almost all dealers report a good influx of business. Grinders, boring machines, and lathes are selling well. But dealers report prices are still well below those of a year ago.

Toolroom equipment, however, has not shared in the recent upsurge of interest to the same extent.

One supplier reports his business in September was up 70 pct over August, and was about 10 pct better than the same month a year ago. Customers, he said, are beginning to feel quite bullish. Not all dealers, of course, have experienced such a decided improvement in sales and some still aren't too optimistic.

Waiting for Upturn—Few are prepared to say just how far and for how long the pickup will continue, but they must find it difficult not to feel optimistic.

"We know there is a lot of business overhanging the market from the number of quotations on equipment we have been asked to make in recent months. Metalworking plants have been telling us they know they need equipment, but have been holding off purchasing it until there are signs of a business pickup.

"Some have seen a pickup in their business and they're out buying equipment. As soon as the others experience it, we should be hearing from them too," a machinery dealer reports. "Settlement of the auto industry contract talks should give a boost to business."

Auto Work Awaited — Another dealer is hopeful that settling auto-labor contract differences will provide a boost to used machinery sales. "We've a feeling that the big auto companies are going to release a flood of work to smaller companies when they get their contracts signed.

"However," he warned, "we haven't felt much change in our sales yet. And if sales don't take a decided turn for the better in a few months, it's going to be hard on a lot of the dealers."

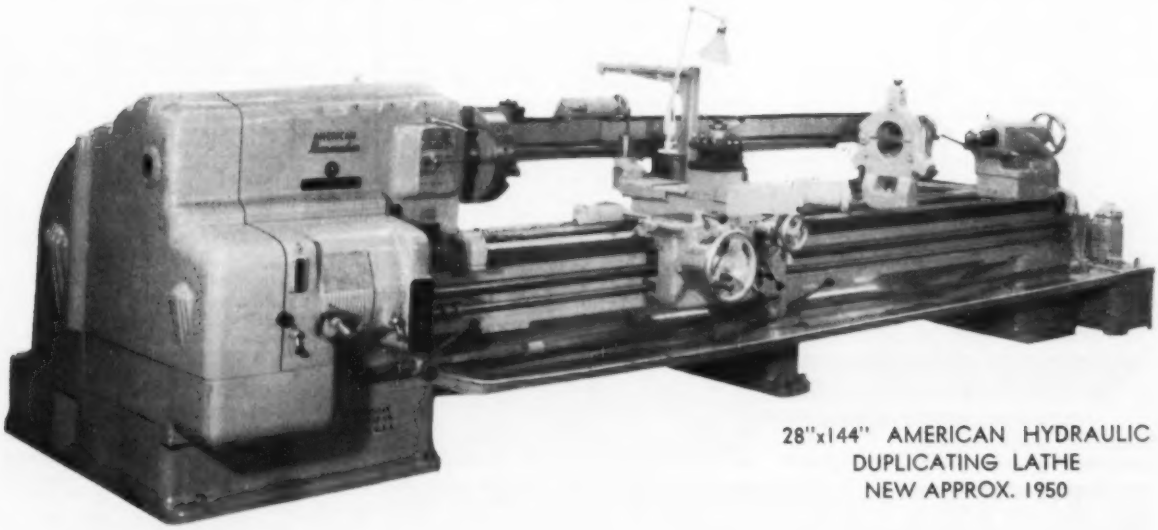
Good Stocks Ready—One thing for sure: Customers shouldn't have too much difficulty finding what they want in the way of equipment. Nearly all used machinery dealers report they have about the largest selection of good equipment on hand that they have ever had.

THE CLEARING HOUSE

EMERMAN MACHINERY CORPORATION

OFFERS FROM STOCK THE FINEST MACHINE TOOLS AVAILABLE ANYWHERE

FOR SALE OR RENT



28"x144" AMERICAN HYDRAULIC
DUPLICATING LATHE
NEW APPROX. 1950

24" x 120" cc American Engine Lathe, New Approx. 1946

25" x 120" cc American Pacemaker Engine Lathe, New Approx. 1953

28" x 144" cc American Pacemaker Engine Lathe, New Approx. 1950

42" x 9' cc Niles Heavy Duty Engine Lathe (Rebuilt), New Approx. 1943

50" x 9' cc Niles Heavy Duty Engine Lathe, New Approx. 1943

#4 Warner & Swasey, Ram Type, Turret Lathe, Bar Feed, New Approx. 1950

#4L Gisholt H.D. Turret Lathe, 12" Hole, Cross Sliding Turret, New Approx. 1943

#10 Sundstrand Automatic Lathe, 36" cc, New Approx. 1948

#30H Bullard Manutrol Automatic Lathe, New Approx. 1950

42"-50" Niles Vert. Boring Mill (3), New Approx. 1952

54" Bullard Vert. Boring Mill, Spiral Drive, New Approx. 1943

#112C Ex-Cell-O Single End Borematic, (3), New Approx. 1952

#DB17 Ex-Cell-O Double End Borematic, 4 Heads, Cross Sliding Table, (2), New Approx. 1953

#1212A Ex-Cell-O Double End Borematic, Hyd. Cross Sliding Table, New Approx. 1948

10" x 36" Norton Model CTU Grinder, New Approx. 1953

25" x 72" Landis Model DH Crankshaft Grinder, Brand New, Built Approx. 1952, Never Used

#1209 Bryant Internal Grinder, New Approx. 1951

56" x 56" x 12' Sellers, Power Flo, Double Housing Planer, New Approx. 1940

72" x 72" x 14' Cincinnati Hypro Openside Convertible Planer, Formica Ways, New Approx. 1940

72" x 72" x 16' Sellers, Power Flo, Double Housing Planer, New Approx. 1941

96" x 84" x 20' Cincinnati Hypro Double Housing Planer, New Approx. 1938

36" x 72" Cincinnati Horiz. Hydrotel, New Approx. 1943

#1248 Kearney & Trecker Duplex Mill, New Approx. 1951

#56-90 Cincinnati Duplex Mill, New Approx. 1953

#56-96 Cincinnati Plain Hydraulic Mill, New Approx. 1950

#5 CSM Kearney & Trecker Vertical Mill, New Approx. 1948

#33-1448M Sundstrand Mill, New Approx. 1955

#56T Giddings & Lewis, 6", Oversize Table Type Horiz. Boring Mill, Out Riggers, Rotary Table, New Approx. 1940

#224 Cincinnati Rise & Fall Mill, New Approx. 1953

#22 Sundstrand Rigidmill (2), New Approx. 1953

Model OT Cincinnati 4 Spindle Profile Mill, Tracer Attach., New Approx. 1943

#24 Gleason Straight Bevel Gear Generator, 35" D.P., New Approx. 1942

#2LBM Leland Gifford 6 Spindle Hyd. Drill, #2 M.T., New Approx. 1952

#B4B Natco Drill, Adjustable Arms, 2" Upperjoints, New Approx. 1943

8'19" Carlton Radial Drill, New Approx. 1945

#2 Cincinnati Flamatic Hardening Machine, New Approx. 1953

#5-54 Cincinnati Vertical Broach, New Approx. 1951

#66 SKF, 10 Ton, Cincinnati Vertical Broach, New Approx. 1951

#5-42 DRV LaPointe Vertical Broach, New Approx. 1955

1600 Ton Bliss Forging Press, New Approx. 1951

THIS IS BUT A SMALL CROSS SECTION OF OUR MACHINES IN STOCK

EMERMAN MACHINERY CORP.

865 WEST 120th STREET **PUllman 5-7626** **CHICAGO 43, ILLINOIS**

CONSIDER GOOD USED EQUIPMENT FIRST

ANGLE BENDING ROLL
4" x 4" x ⅝" Thomas #3 Horizontal
BALER
Model 123PX76 Logemann Hydraulic Baler Box 76" x 18" x 30" Deep, Bale 18" x 8"
BENDING ROLLS
8' x ¼" Bertsch Initial Type
12' x ⅝" Hilles & Jones Pyramid Type
13' x 3/16" Bertsch Initial Type—NEW
32' x ⅜" Baldwin Pyramid Type
BORING MILL—VERTICAL
144" Cincinnati Hypro Vertical Boring Mill
Two Swivel Type Ram Heads
CRANES—OVERHEAD ELECTRIC TRAVELING

7½ ton	P&H	60' Span 230 Volt D.C.
8 ton	P&H	55' Span 220/3/60
10 ton	P&H	50' Span 230 Volt D.C.
10 ton	P&H	39' Span 230 Volt D.C.
10 ton	Milwaukee	57' Span 220 Volt D.C.
10 ton	Shaw	48' Span 230 Volt D.C.
10 ton	Whiting	75' Span 220/3/60 A.C.
10 ton	Shaw	120' Span 230 Volt D.C.
15 ton	P&H	50' Span 230 Volt D.C.
15 ton	Northern	54' Span 230 Volt D.C.
15 ton	Shepard Niles	50' Span 230 Volt D.C.
15 ton	N-B-P	100' Span 220/3/60 A.C.
120 ton	Shepard Niles	77' Span 220/3/60

DRAW BENCHES
3000 lb. Draw Bench, 20 ft. Pull
7000 lb. Draw Bench, 50 ft. Pull—New 1956
10,000 lb. Draw Bench, 50 ft. Draw—LATE
FORGING MACHINES
1" to 5" Acme, Ajax, National
HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING 800 lb. to 12,000 lb. incl.
LEVELERS—ROLLER
54" McKay 17 Rolls 4⅛" dia.
60" Aetna Standard, 17 Rolls 4⅜" dia.
72" McKay, 15 Rolls 4¼ dia.
84" Bliss 17 Rolls 5⅛" dia.
PLANER—OPEN SIDE
70" x 110" x 16' Liberty Four Head
POLISHING MACHINE
20" Murray-Way Micro Polish Machine—NEW 1950
PRESSES—HYDRAULIC
500 ton Watson Stillman Piercing Press 48" x 72"
500 ton HPM Fastraverse, Bed 36" x 36"
1000 ton HPM Fastraverse, Bed 48" x 72", 36" Stroke
4500 ton B-L-H Bed 68 x 68", Stroke 40"
PRESSES—STRAIGHT SIDE
190 ton Toledo #57½, 10" Stroke, Bed 20" x 20"
215 ton Clearing, 24" Stroke, Bed 36" x 42"
PRESS—TOGGLE DRAWING
#168¾ Toledo, 18" Stroke of Blankholder, 28" Stroke of Plunger, Bed 48" x 51"
PUNCH & SHEAR COMBINATIONS
Buffalo #1½ Ironworker
Cleveland Style C; Arch Jaw, Capy. ⅝" x ¾"
Cleveland Style EF, Capy. 1¼" x 1"
ROLLING MILLS
6" x 5" Torrington Flat Wire Mill Line
2½" x 9" x 9" 4-High Strip Mill
3¼" x 7" Six Roll Cluster Mill
10" x 14" Single Stand Two High
10" x 16" Single Stand Two High
12" x 12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 24" Single Stand Two High
20" x 36" Single Stand Two High
ROLL—FORMING
18 Stand Custom Built, 2½ Shaft, will take 36" wide
ROLLS—PLATE STRAIGHTENERS
108" Bertsch, Seven Rolls 9" Dia.
72" Niles 7 Rolls 9" Dia. Motor Driven
SHEAR—ANGLE
6 x 6 x ⅝" Hilles & Jones
SHEAR LINES
36" x .020 Ga. Halliden Shear Line
96" Cleveland, Capy. 14 Ga. Pay Off & Tables
SHEARS—SQUARING
6' x 14 Ga. Edwards, Motor Drive—LATE
10' x ⅜" Niagara
14" x 3/16" Cincinnati #1814
SLITTERS
12" Waterbury Farrel, 2⅜" Dia. Arbor
30" Yoder M-2-⅛ Slitting Line
36" Yoder, 4½" Dia. Arbor
STRAIGHTENERS
Torrington #1734 12-Roll, Capy. 1⅜" Rd. 1-9/16" Sq. etc.
Kane & Roach #5250 5-Roll, Capy. 2½" Solid, ⅜" Tube
Medart OA, Capy. ⅛" to 1" Solid
⅛" Shuster, With 12 ft. Cut Off
⅜" Shuster, With 12 ft. Cut Off
SWAGING MACHINES
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1	1500	G.E.	MT	6600	1187
1	800	Whse.	CW	550	1776
1	700	A.C.		2300	500
1	600	Whse.	CW-4-32D-15	440	1778
1	500	G.E.	MT-412	2200	439
1	500	Whse.	CW	550	350
1	350	Cr. Wh.	Blue 718H	208/416	1765
1	350	G.E.	IM-17A	220/440	720
1	350	Whse.	CW-10-39C-15	440	720
1	250	G.E.	IM-16	220/440	875
1	250	G.E.	MT343Y	220/440	875
1	250	A.C.	Any	550	600
1	250	Whse.	CW	2200	450
1	250	Cr. Wh.	Blue 29Q	2300	850
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
1	200	Whse.	CW-874D	220/440	885
1	200	Cr. Wh.	8R-29QB	440	505
2	200	G.E.	IM-17A	2200	485
3	100	A.C.		440	695

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1	500	G.E.	FT-559AY	2200	3600
2	500	Whse.	CS-1115	2300	863/445
4	500	Whse.	CS-1216	2200	500
1	400	Whse.	CS-7151-610H	6600/4000	3585
1	300	Whse.	CS-1062	2300/440	600
2	200	Whse.	CS-8558 D.P.	220/440	1750
1	150	G.E.	IK-15	2300	880
1	150	G.E.	FT-358	2200	875
1	150	Whse.	CS	440	580
1	125	Whse.	CS-764C	220/440	1160
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2	1750	G.E.	ATI	2300	3600
1	1750	G.E.	TS .8P.F.	2300/4600	900
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1	200	G.E.	IM	440/2200	580
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300	*West.	CS-1002	900
250	*West. (TE)	CS-8120S	1800
250	*G.E.	KT-559-S	1800
250	*West.	CS-875-S	1800
250	Brook	RS-28	1200
250	West.	CS-1000	720
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200	Brook	RS-27	1200
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200	*West.	CS-930-A	900
200	G.E.	KT-564-S	720
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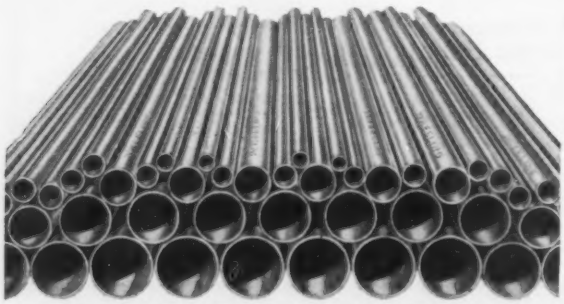
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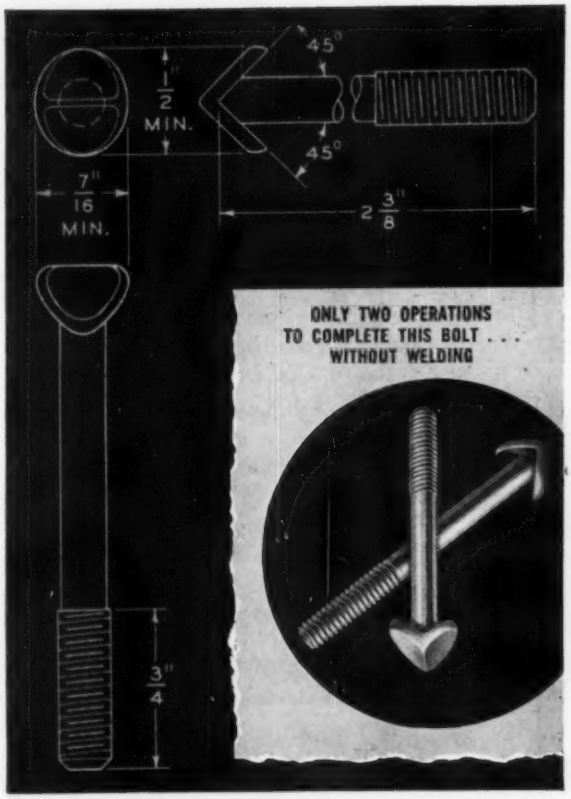
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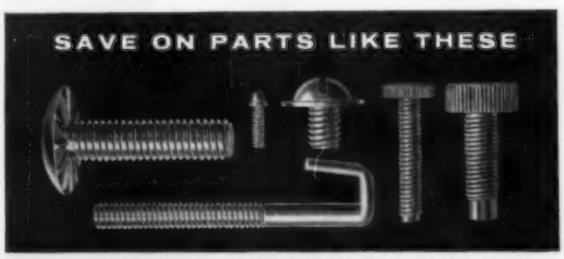
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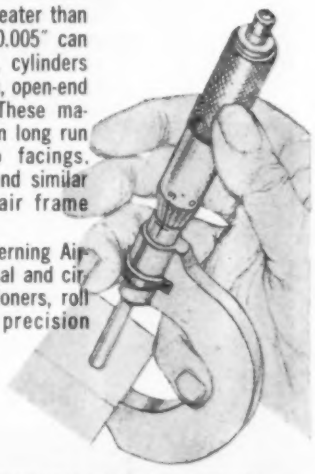
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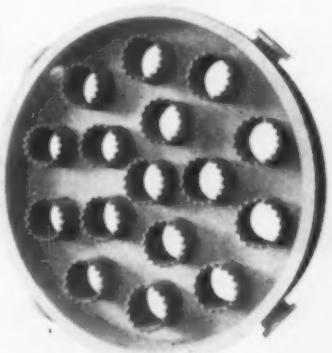
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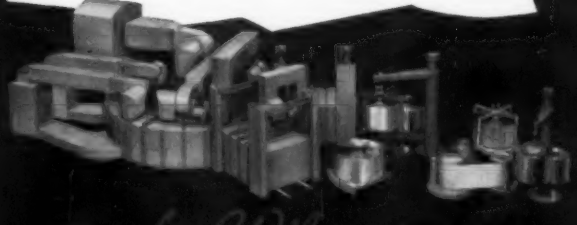
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